THE GRAY SHEET

Computer Industry

REPORT

INTERNATIONAL DATA CORPORATION

PC Software
Review and Forecast

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR OCTOBER 18, 1991 • VOL. 27, NO. 1 Published continuously since 1964.

Will OS Confusion Stall PC Software Growth?

Ten billion and going strong. PC software, growing more than ten times faster than the U.S. GNP, looks like the ultimate growth market. New customers are growing by almost 10% annually. Old customers keep buying add-on applications packages. Technology trends are on its side, too: faster PCs with lots of memory and disk storage will always need better systems and application software.

Such rapid growth rarely proceeds without a false start or two. Personal computer software revenues grew last year by 30%, after scant 15% growth in 1989 over 1988. And now the potential of further growing pains looms. Structural roadblocks — questions about DOS's, Windows' and "NT's" future, the unknown impact of client/server computing paradigms, and the struggle to develop the next-generation desktop operating system may combine to stall or slow growth.

What are the short-term implications for software suppliers and users? How fast can their revenues grow? How big is the long-term software opportunity? Consider the following:

- **Operating system uncertainty:** Microsoft's DOS is still tops, but from a technology perspective it has reached the end of the line. It was an 8-bit OS rewritten to take advantage of Intel 80386s. Making the transition to 32-bit functionality (to take advantage of newer Intel chips, and anything RISC) will be much harder. Fortunately for Microsoft, competitors have only toed the line: they aren't running yet. Contention for dominance of desktop OS between IBM/Apple, Microsoft, and various flavors of Unix has generated little more than customer confusion. Questions like "What will run Windows apps better, OS/2 2.0 or 'new technology?'" and "Can a 16-bit client survive on a 32-bit server?" only increase uncertainty. Independent software vendors (ISVs) waiting in the wings to write tomorrow's hot new applications are still waiting. Users ready to downsize their mainframes into PC client/server oblivion are faced with a confusing array of choices.

- **Windows 3.0 activity**: As a result of the OS uncertainty the brightest spot over the past year has been Windows 3.0 applications development. Almost 1,300 suppliers have rewritten 1,500 applications for 3.0. Introduction of Windows applications and upgrades is responsible for almost all of the growth in word processing and spreadsheet applications markets.

- **Supplier consolidation:** Some of the largest PC software companies were rumored to be takeover targets in the last 12 months. A few friendly mergers went through: Novell bought Digital Research; Borland, Ashton-Tate; Symantec, Peter Norton; Lotus, Samna (Lotus now sells four different word processing packages). Despite continued double-digit unit and revenue growth, PC software suppliers face a maturing market for their products. With next-generation OS uncertainty keeping a lid on any revolutionary function-

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ality leaps for another two years, look for their markets to further consolidate.

- **IBM's mixed OS message**: Change has been a hallmark of every computer market over the past thirty years. But usually the reaction of one company could be used to put the change in perspective. If it was a segment IBM dominated, it acted conservatively. If IBM was weak, it was more aggressive. Over the past ten years IBM has been the dominant PC supplier. It has slipped recently, but still generates more PC revenues than anyone. IBM may now be paying the price for overly conservative product line management. It has three distinct — and confusing — PC messages, depending on the audience. There's the mainstream OS/2-and-PM-as-SAA-client story for commercial customers. There's the RS/6000 story for technical users (but IBM's biggest workstation *competitors* are very aggressively pushing into commercial markets, making IBM's workstation *customers* wondering if they should be, too). Finally, IBM is talking up an Apple OS on a scaled-down, commercialized RS/6000 chip, making everyone wonder what IBM's really up to. Is OS/2 a client or a sever operating system ... or both? Until IBM delivers a tighter OS message, its largest customers may stall making decisions, or just look elsewhere.

- **IBM's PC apps no better:** On the applications side, IBM has just announced the dissolution of its Personal Software group. IBM is apparently acknowledging it can't write the applications itself, so it will buy and repackage applications, or simply let the market take care of itself.

- **New paradigm software**: Hardware and software suppliers are promising computer systems with new metaphors for workflow automation, information access and new combinations of process servers, desktop PCs and handheld pen-based computers. Promising "openness" and forward and backward compatibility within those new paradigms is important for anyone selling PC software today: everyone must make the promises. Delivering the compatibility is another question. Users may end up stalling significant PC software purchases until the ultimate shape of the new paradigm is more clear. Without the promises, suppliers may be leaving a significant opportunity on the table.

- **The opportunists' market**: With low development barriers — distribution barriers can be a different story — and much-publicized, yet undeveloped, markets like multimedia, few industries offer such large potential rewards for small companies. Hundreds of startups may be developing a next generation of application to drive industry growth. Many companies hastily developing pen software are new entrants to the business.

- **New licensing schemes**: New distribution media, de facto standard hardware and systems-level software platforms, and server-distributed software will help drive the growth of interoperable software. Interoperability, in turn, will affect licensing agreements and suppliers' revenue. The result: floating licenses and programmable keys which enable and disable functions and which limit number of users. Frame now uses Sun's ONC for license management in networked implementations. Suppliers may see a significant shift in the process by which they realize revenues.

Two types of PC software strategy are apparent. "niche" suppliers like Central Point, Adobe, and Volkswriter fill the needs of a specific audience of users with a single product. PC software companies invariably start out this way. The most extreme example: a supplier creates a market by driving PCs to new functionality and dominates the new market

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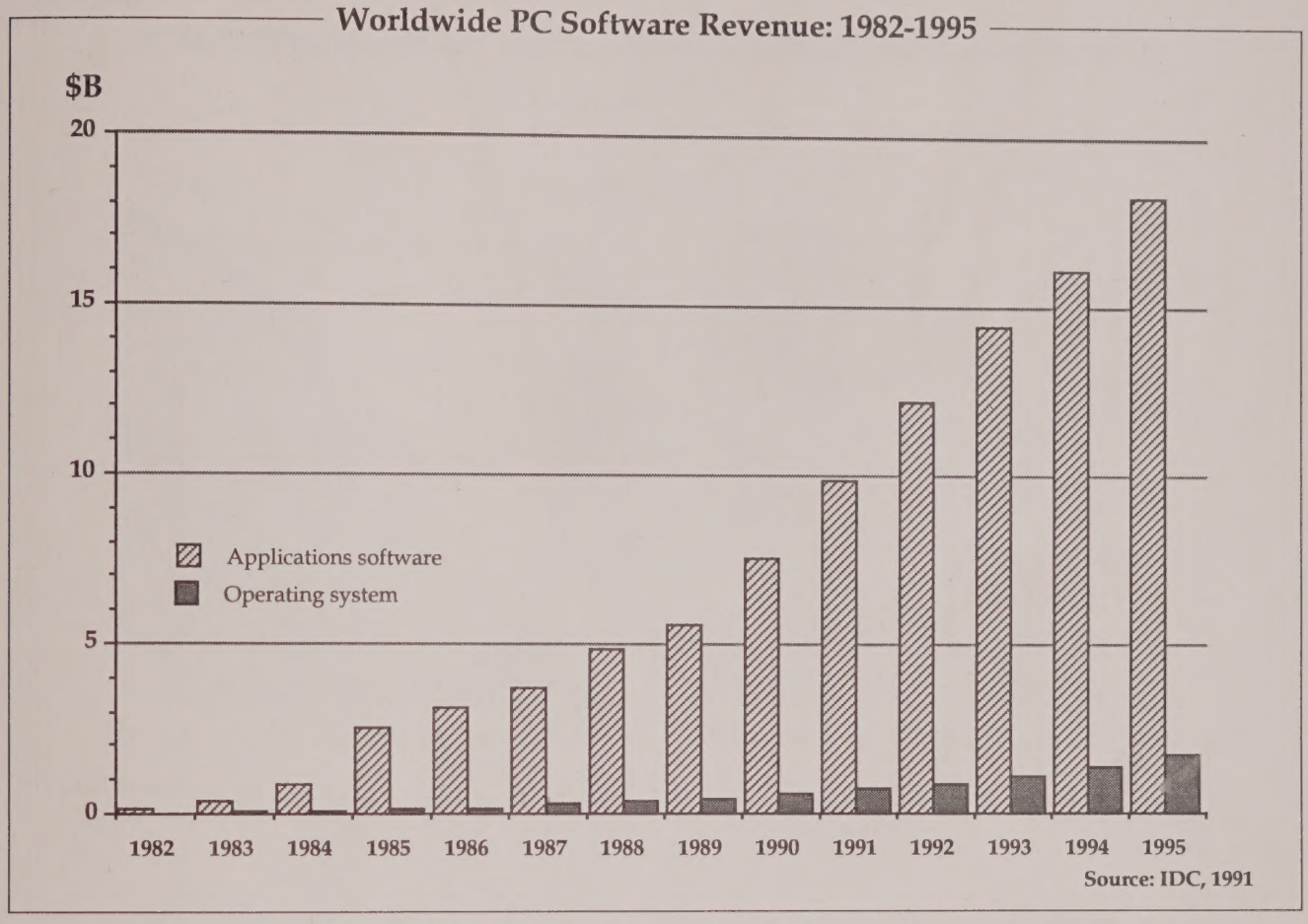


until other suppliers ready products. Many niche suppliers quickly expand outside their initial niche and attempt to become broader applications suppliers.

On the other hand are "full-line" suppliers like Microsoft and Lotus (and, increasingly, Borland and Symantec). Their sales represent a majority of the PC software market. Each such supplier started with a strong presence in a specific area. They then expanded, through either internal development or acquisition, a portfolio of products that, by supposedly working together, were supposed to make an organization's PCs more productive. Collectively they rarely did. Nonetheless, suppliers continue to milk individual packages.

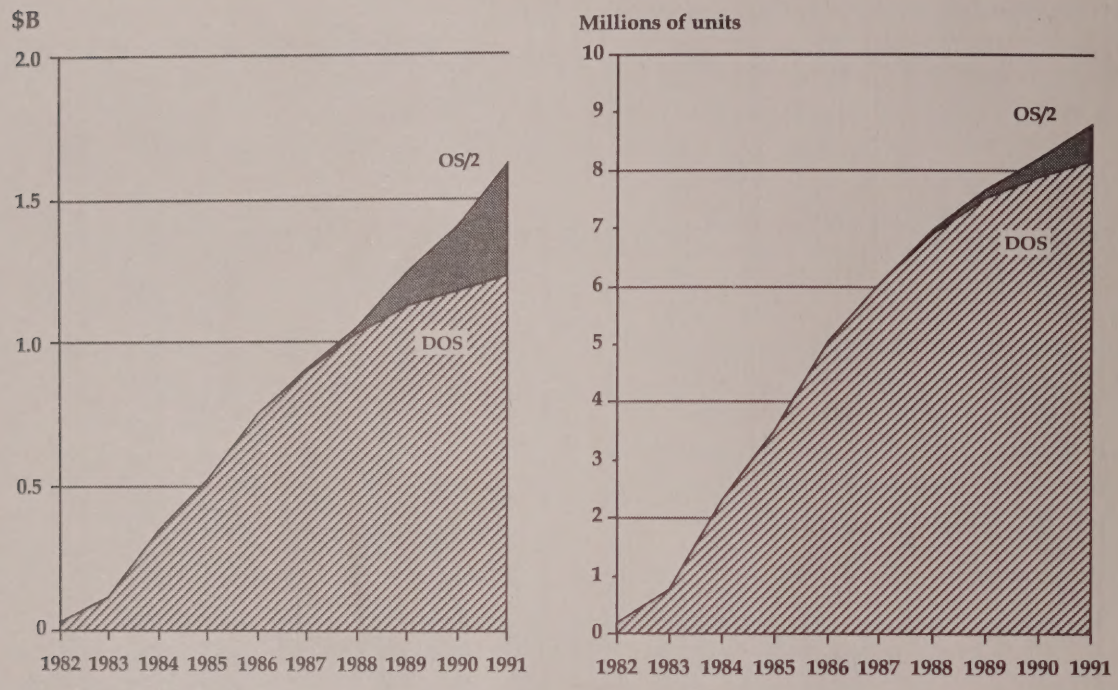
The penetration of individual applications into customers' everyday routine increases the applications' value to customers. As suppliers develop slicker and slicker versions of their core products, customers gain even more. Witness Lotus and Borland. But another result has been a dismaying inability to communicate between applications from different vendors.

PC software suppliers face integration or interoperability: they must make data available across applications or applications available across systems. Against the background of consolidation, and among an ever-growing number of startups, they'll only be able to leverage their current presence unless they quickly chart their courses through those two obstacles.

Overall, the PC software will be a strong growth market over the short and long term. Uncertainty in the composition of the next generation of software suppliers overshadows the fundamental health of the PC software industry. IDC expects software revenues will continue to climb in the 20-30% range annually over the next five years as the DOS/Windows segment begins a long slow decline. It won't ever do much worse.

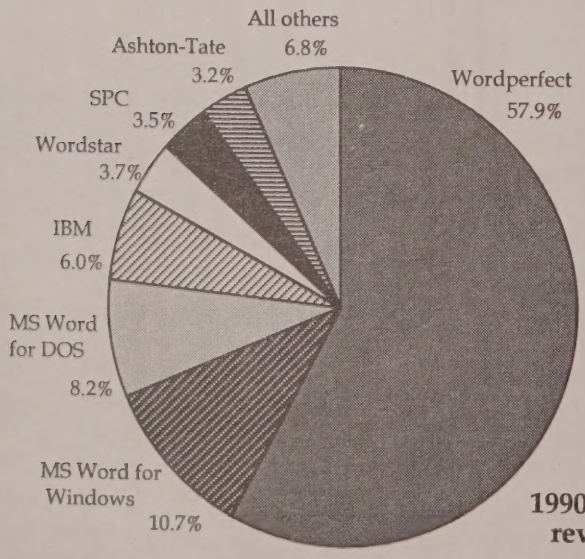
— with Nancy McSharry

United States DOS and OS/2 Unit Shipments and Revenue, 1982-1991



Source: IDC, 1991

1990 United States PC Word Processing Market Share Leaders



1990 U.S. word processing revenue: $464.7 million

Source: IDC, 1991

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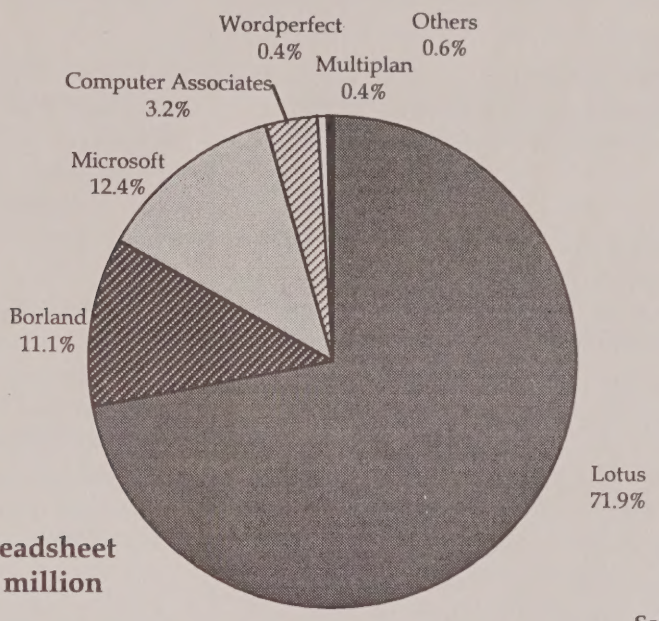
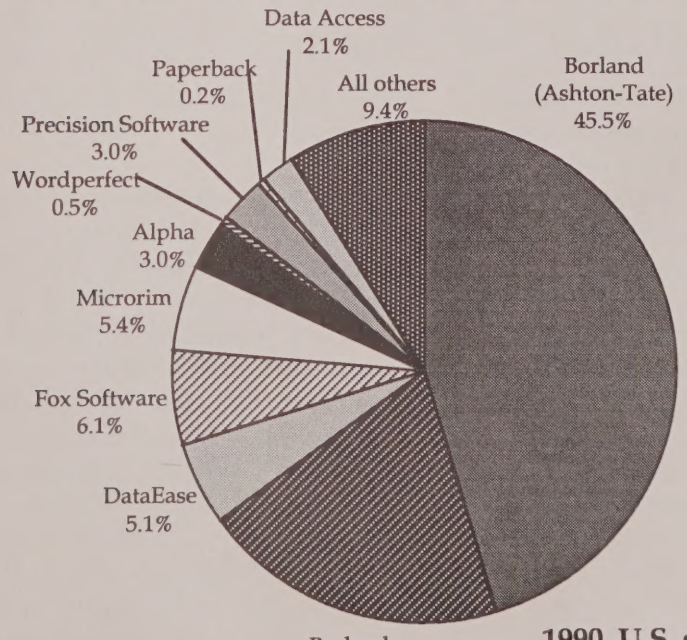
1990 United States PC Spreadsheet Market Share leaders



1990 U.S. PC spreadsheet revenue: $444.8 million

Source: IDC, 1991

1990 United States Standalone Database Market Share Leaders



1990 U.S. standalone database revenue: $330.3 million

Source: IDC, 1991

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Profiles and Strategies Amid the Changing Development Model

Today's PC software competition is colored by two dueling modes of operating system development: a traditional closed method and a newer one built on consensus.

The traditional system is most recently embodied by Apple/IBM plans: A company decides what's best for customers and goes off to build an operating system. Simple. Generally speaking, the only operating systems that have actually met preannounced ship dates were developed this way.

The newer model of OS development capitalizes on "openness." It is the ACE way: a bunch of suppliers with differing priorities band together under the banner of "doing what's best for the industry." Whether or not it is, we don't really know. Whether they can pull it off seems dubious.

So how does that affect applications development? Applications suppliers must decide now where to funnel their development resources.

Dueling standards in the computer industry — in this case IBM/Apple and Microsoft/ACE — are hardly new. The most recent and most notable example, the so-called Unix wars, illustrates that a healthy competition may not be so bad for applications developers and their customers. Here is a rundown on some major PC software suppliers' strategies as they edge toward the brink of a market dominated by a next-generation, 32-bit operating system.

Microsoft: It's no wonder the Justice Department came around. Microsoft accounted for *slightly over one-half* of all of 1990's 1.6 million shipments of Windows applications. The next closest Windows application supplier, Aldus, shipped only 100,000 units. Now that's leveraging an opportunity. On the systems side no company has a tougher job. IBM and Apple have only to deal with each other. Microsoft has a couple dozen ACE partners. Pleasing them all will be impossible. If it succeeds in developing a 32-bit OS that runs on MIPS and Intel chips, it will have replicated its position as the most poweful company in the PC industry. If that happens, Microsoft's applications business will probably widen its lead in core markets: Excel and Word. If not, the applications business will still thrive, but won't dominate. Microsoft handled the great gift of DOS reasonably well, but today it looks more like an applications company than an OS company.

IBM: On the heels of the Apple collaboration, one logical conclusion is that OS/2 is as good as dead. Even before the Apple announcement, IDC's most optimistic forecasts had OS/2 holding only single-digit worldwide market share in 1995. Where's IBM's long-term commitment now? For all of the exciting aspects of IBM's and Apple's joint OS development project, IBM has failed miserably at placing the project into the appropriate context. Major customers, and potential customers, have no idea where POWERopen fits with OS/2 and Windows. IBM's not telling. As a result it has the large and serious challenge of making sense out of its three lines of desktop products. On the up side: if any company can pull off, first, the background market development and, second, the technology development inherent in the Apple project itself, it is IBM. If OS/2 does Windows better than Windows, if it is priced below $150, and if IBM can communicate a believable marketing message that OS/2 remains an important core product, OS/2 may yet survive.

Sun Microsystems: SunSoft's recent announcement of Solaris's availability on Sparc *and* Intel architectures signifies a return to pre-Sparc strategy: reliance on software as the basis for proliferation of industry influence. It is and always has been ease-of-use and applications that convinced users to buy Sun hardware. Solaris is an important step in taking advantage of the workstation OS and applications lead that SunSoft now holds, with some interesting implications. SunSoft will probably port Solaris to other architectures like HP's PA-RISC. Sun itself might reenter the Intel hardware market. Solaris is not optimized for Intel architectures, making for possible sneaky performance comparisons between the two platforms. Look for more deals with Novell, and a deal with Microsoft. Novell's distribution strengths provide Solaris a real boost. If Sun and Microsoft

were to come to an understanding that would result in the Windows API on Sparc, ACE's major advantages would be diminished.

Lotus: Continuing the trend of the last three years, Lotus's spreadsheet products experienced further decline in U.S. and worldwide shipment and revenue market share. Prospects that 1-2-3 for Windows would reverse that trend remain bleak. Since its August introduction it has sold poorly. Internally developed (Notes, Ami) and purchased (Samna, cc:Mail) efforts at diversification will pay off, but no time soon. And, Lotus 1-2-3 for Macintosh still hasn't shipped. With no systems-level market presence, Lotus is increasingly at risk when developing future versions of its breadwinners. It would just as soon see Apple/IBM succeed to spite Microsoft, and may well team up with Apple and/or IBM to see that that happens.

Wordperfect: No other company so clearly missed the Windows opportunity; Wordperfect will ship its first Windows word processor this week, almost 18 months since Windows 3.0 availability. Where now? Continued dominance of DOS-based WP (46% of 1990 worldwide revenue) can fund lots of R&D.

Borland: By buying Ashton-Tate, Borland has gained instant standalone database leadership and is a step closer to lining up Oracle in its sights. First it must coordinate the merging of a dozen different products and directions into a single coherent strategy. Then its job just gets harder. The distributed database market Borland is now pursuing is a bit more complex than the PC markets it has conquered.

Novell: If Novell bought Digital Research as insurance against IBM and Microsoft, the premiums were high and the coverage low. Novell appears to be mirroring Microsoft's attempts to more tightly couple desktop and network OSs. But while Netware competes well with LAN Manager, DR-DOS has little influence in PC OS markets. More tightly integrated client/server-based systems will need stronger applications support than Novell now claims. Buying it will be expensive.

PC Software Suppliers' Delusions of Grandeur?

Year	1987	1989	1991
Company	Ashton-Tate	Lotus Development	Microsoft
Chairman's vision	Data management leadership across all platforms: "database of the enterprise"	User interface of choice: the "cross-platform data lens. " Application development tool for mission-critical apps.	Windows as ubiquitous operating system, across enterprise, across all platforms
Product reality	Good file-access method for DOS computers	Best-marketed character-based spreadsheet	Best desktop manager for DOS computers
Result	Company sold	Loss of spreadsheet market share, external acquisitions drive growth	?

Source: IDC, 1991

The Promise of Object

Conventional wisdom holds that the two biggest areas of opportunity in the computer industry are in software publishing and in value-adding professional services. Entry barriers there have been described as lower, competitive advantages more sustainable, and potential payoffs more attainable. It's reasonable to suppose that two conditions used with more frequency than ever to describe the computer industry — maturation and consolidation — may affect that impression.

Webster defines *opportunity* as "a good chance for advancement or progress." The "chance to advance or progress" abounds in the PC software business. One might frame that opportunity with the definition: "the gap between the processing potential of today's hardware, and the level of productivity provided by currently available applications and applications tools." It is a gap that has spawned revolutionary change in large organizations and dozens of PC software startups. It is also a gap that must be narrowed if one is ever to draw the conclusion that the advent of personal computers has in any way increased the productivity of the white-collar workers who use them.

Does consolidation dampen the software opportunity? Probably not. The PC software market in 1991 is characterized by exceptional levels of activity at either end of the spectrum: large and small. Look at IBM. In one breath it announces another purchase of a small software supplier, and then turns around and closes its PC application software group. The largest PC suppliers have entered into a phase of consolidation. Nonetheless, the barriers to entry are still low: new suppliers stand waiting to enter the market. Thousands (if not millions) of individuals dream of creating new innovative ways of harnessing ever-abundant desktop MIPS. That doesn't necessarily mean "killer application" or multimedia"Software opportunity" may well mean gradual improvements in existing applications and systems. More likely than the revolutionary improvements are more gradual improvements associated with things like granular units of object code that can be packaged into whole ranges of applications. And anyone with the right smarts can do it.

Are today's software suppliers locked out of the opportunity? Again, probably not. Software innovation thrives at the lowest levels of development groups, most notably the individual. But even large organizations can harness software opportunity. And we're not just talking about milking successful products which, while not growing as fast as they used to, are still very profitable. Two possible reconfigurations:

Scenario one sees further consolidation at the high end. A few megacompanies — Microsoft, Lotus, Borland, Aldus — tighten hold over traditional application segments. Multimedia is real and innovation is defined according to a similar model: the killer application that gave rise and (onetime) marketplace dominance to Wordstar, Ashton-Tate (dBase), Lotus (1-2-3), and Aldus (Pagemaker). Opportunity is defined much as it is today — the gap between what is and what might be.

Scenario two goes a step further. Only this time the "promise" of object is realized. An industry grows up around a sea of smallish software shops which specialize in designing portable objects. The end-user applications range from the mundane to the fanciful. The object developers embody evolutionary innovation. Opportunity is theirs. It may actually be enough to satisfy an industry used to 30% annual growth.

Respectfully,

Doug McL

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Bigger Problems and Smaller Rewards Selling PCs; Which Comes First, Consolidation of PC Suppliers or Distributors?

The slow evolution of two trends at the onset of the 1990s — a polarization of and consolidation in the business of distributing personal computers — has been punctuated by well-publicized (read also: notorious) transformations and takeovers. One result: the formerly rock-solid strategy of a company like Compaq now appears as robust as a flag waving in a breeze.

The popularization of terms like mass merchandising, office superstore and consumer electronics demonstrates channel transformation. The sudden prominence of a dizzying array of hybrid dealer entities (such as JWP/Businessland and ComputerLand/Nynex) exemplify consolidation. Both trends now seem to be proceeding faster than ever. They probably are. At stake is the future of every PC company that even mildly resembles Compaq.

Personal computer market polarization is driven by changing buying patterns and falling hardware prices. PC buyers base their purchases on a range of issues. Past experience with the supplier, price, support services, product features and warranty are most notable. Over the past two years, price has played an increasingly important role (see page 3).

As more buyers shop on price, resellers need high volumes to both support lower margins and to trigger lower prices from suppliers. Two camps result: high volume low margin, low volume high margin. The middle ground, with neither margins nor volume, withers. Ergo, polarization.

Consolidation, in turn, results from polarization and as well the endemic industry wide margin squeeze. In the past 18 months no less than one dozen $100 million PC dealers have had their operations either merged with or purchased by other dealers (see page 2). Still, the top five PC dealers represent only approximately one-third of all U.S. PC volume. Five years ago it was more like 15 or 20%. The consolidation is ongoing.

Buying a PC in five years may be as different from today as it is today from three years ago (when terms like consumer electronics meant Sony Walkman, and mass merchants meant Sears' Kenmore appliance brand name). Competition will revolve around a few critical areas:

- **Faster product cycles:** Inventory carrying costs, retraining costs, and losses due to writing off aging inventory, contribute to dealers' margin problems. Ever-expanding product lines built around different versions of the same microprocessor make the problem worse. There's hope: Compaq, Dell and AST among others are promising modular and upgradeable systems.

- **Cross-category channels:** One way to cut costs is by creatively rebuilding a business model. Combining the high visibility of a storefront with centrally managed inventories and 1-800 ordering simplicity (Tandy) is one example. Selected presence in office supplies superstores (Dell) is another. Highly mobile, on-site support swat teams (Digital? Compaq? IBM?) are another. Dealers that simply pare down their operations and operating expenses may be in trouble.

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- **Selling support:** Old line PC dealers are repeating a familiar line: no one wants to pay for support, but everyone expects it. New dealers (mass merchants, consumer electronics outlets) don't care. Selling PC hardware support services (a $4.5 billion business in the U.S. in 1990) remains an important component of low-volume dealers' revenue streams.

Adding value is the bottom line of PC distribution. In all, U.S. buyers spent just over $25 billion for PCs in 1990, up from $19 million in 1987. Since 1987, those dollars have been funneled through a changing network of resellers. Over the next five years, distribution channels will undergo changes of at least similar magnitude.

IDC expects that **direct sales** activity will take a slight uptick over the next several years as suppliers continue to grapple with issues of internal profitability and support of increasingly complex products.

The **dealer channel** will continue to represent a smaller proportion of overall PCs sold, from 58% in 1990 to 52% next year. Absolute unit shipments and shipment value will remain roughly flat. But all is not bleak for PC dealers. As they shift their product mix toward value-adding software and services, and away from hardware, their overall business will continue to grow.

Computer **superstores** accounted for less than 1% of all 1990 PC hardware revenue. By 1995, that will increase to approximately 4%. Two factors combine to restrain superstores' growth: limit on superstore penetration into the second- and third-tier regional markets, competition from alternative channels like office products stores. Superstore' cost structures are closer to those of dealers than their primary competitors: mass merchandisers and consumer electronics outlets. As such, they will feel increasing margin pressure from their leaner competitors.

The **VAR channel** is the current channel of choice for suppliers seeking high value-adding partners. But VARs typically target small customers, and their average sale is relatively small. The focus on smaller customers and smaller sales limits growth of the VAR channel. IDC expects the VAR channel, currently accounting for almost 16% of all PC hardware revenue, will only increase to 18% by 1994. Actual VAR revenues will increase somewhat more quickly as VARS become more aggressive sellers of software and services.

Alternative channels of distribution, like **consumer electronics** stores and **mass merchandisers**, represent a major opportunity for PC suppliers. In 1990 one in ten PCs was delivered through an alternative channel. By 1995 that will rise to one in five.

— with Lee Levitt

Consolidation Among Top U.S. Dealer Organizations

Company	Consolidation Activity	1990 Dealer Channel Market Share
ComputerLand	Bought Nynex Bus. Centers	10
JWP Info. Systems	Bought Businessland	8
Intelligent Electronics	Bought BizMart	6
Inacomp C.C.	Merged with Valcom	4
Tandy Corp.	Formed Computer City based on superstore purchased from Inacomp	3
Computer Factory	Merged with CompuCom Systems, Inc.	2

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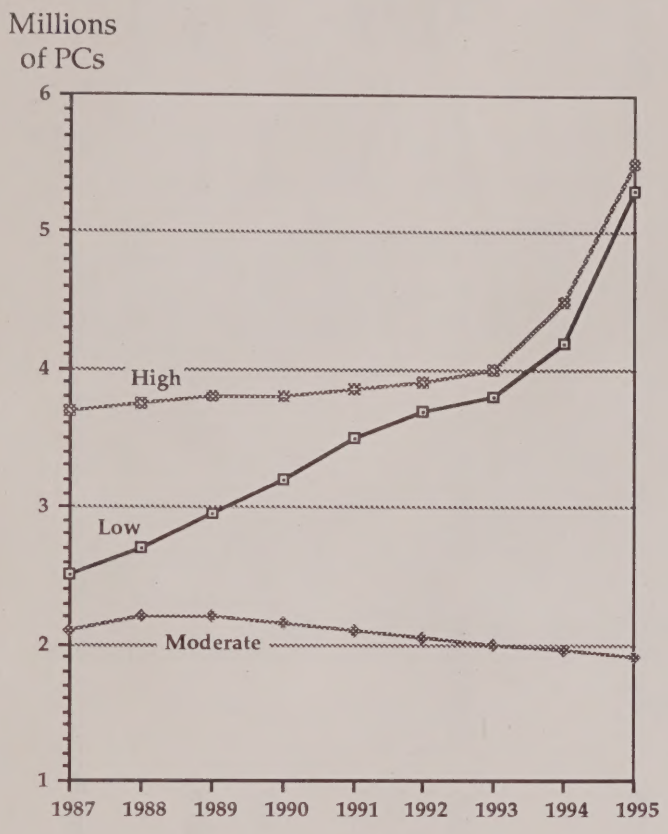
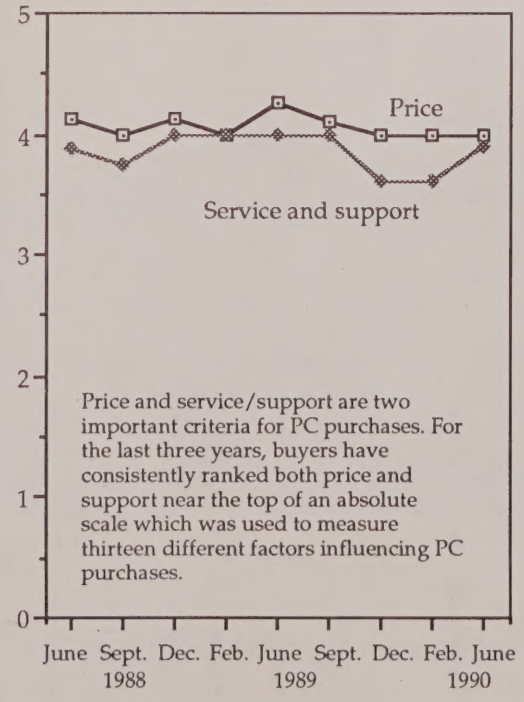
Distribution Channels Polarization, 1987-1995



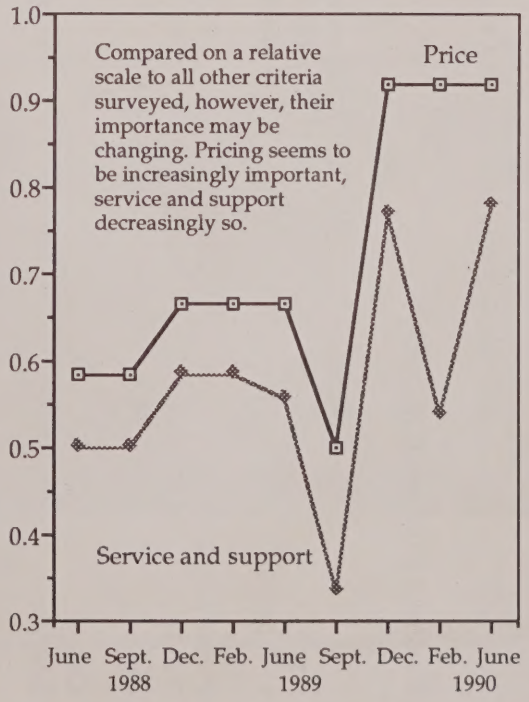
IDC defines channel polarization as the tendency of users to increasingly require either the extremes of high value add, or low value add from their suppliers. The chart at left shows either extreme gaining unit market share through the middle of the decade. For a closer look at the forces driving polarization, we examined three years of PC buying intentions research. The chart at bottom left shows two criteria — price and service/support — measured on an absolute, five point scale over three years. The chart at bottom right measures the importance of each criteria relative to other factors. A 0.5 rating indicates equal relative importance to all other factors studied. A higher rating indicates that the criteria was judged by respondents to be of equal or higher importance than other factors: compatibility with other PCs, engineering quality, and advertising, for example.

The net result: price remains important, and is perhaps becoming more important. Service/support appears to be becoming less important. Channel polarization is driven by more than the (obvious) implications of dropping PC prices. It's being driven by users' changing requirements.

Importance
1=low, 5=high



Importance relative to other criteria



Leading Suppliers' 1990 Personal Computer and Workstation Distribution Channels

Personal Computer Suppliers

	Direct	Dealer	Superstore	VAR	Mass Merchant	Consumer Electronics	Mail Order	Other	Total
Apple	397,060	2,064,711	185,295	—	—	—	—	—	2,647,066
Compaq	—	1,296,237	278,613	—	—	—	—	—	1,547,850
IBM	381,140	3,668,473	—	571,710	142,928	—	—	—	4,764,250
Packard Bell	—	213,272	13,330	6,665	193,278	239,931	—	—	666,475
Tandy	271,796	714,152	—	114,440	—	—	—	—	1,100,388
ZDS	128,497	432,832	—	114,971	—	—	—	—	676,300
Other Suppliers	1,002,867	5,077,878	168,057	2,268,244	418,654	407,428	1,310,569	303,931	10,984,629
PC Totals	**2,181,360**	**13,467,555**	**181,387**	**3,539,938**	**754,860**	**647,359**	**1,310,569**	**303,931**	**22,386,958**

Workstation Suppliers

	Direct	Dealer	Superstore	VAR	Mass Merchant	Consumer Electronics	Mail Order	Other	Total
Digital	497,253	—	—	25,790	—	—	—	29,955	599,100
HP	404,234	—	—	330,737	—	—	—	—	734,970
Sun	466,249	24,801	—	471,210	—	—	—	29,761	992,020
Other Suppliers	643,652	5,553	—	242,859	—	—	—	39,977	885,910
WS Total	**2,011,388**	**30,354**	**—**	**1,070,596**	**—**	**—**	**—**	**99,693**	**3,212,000**

Source: IDC, 1991

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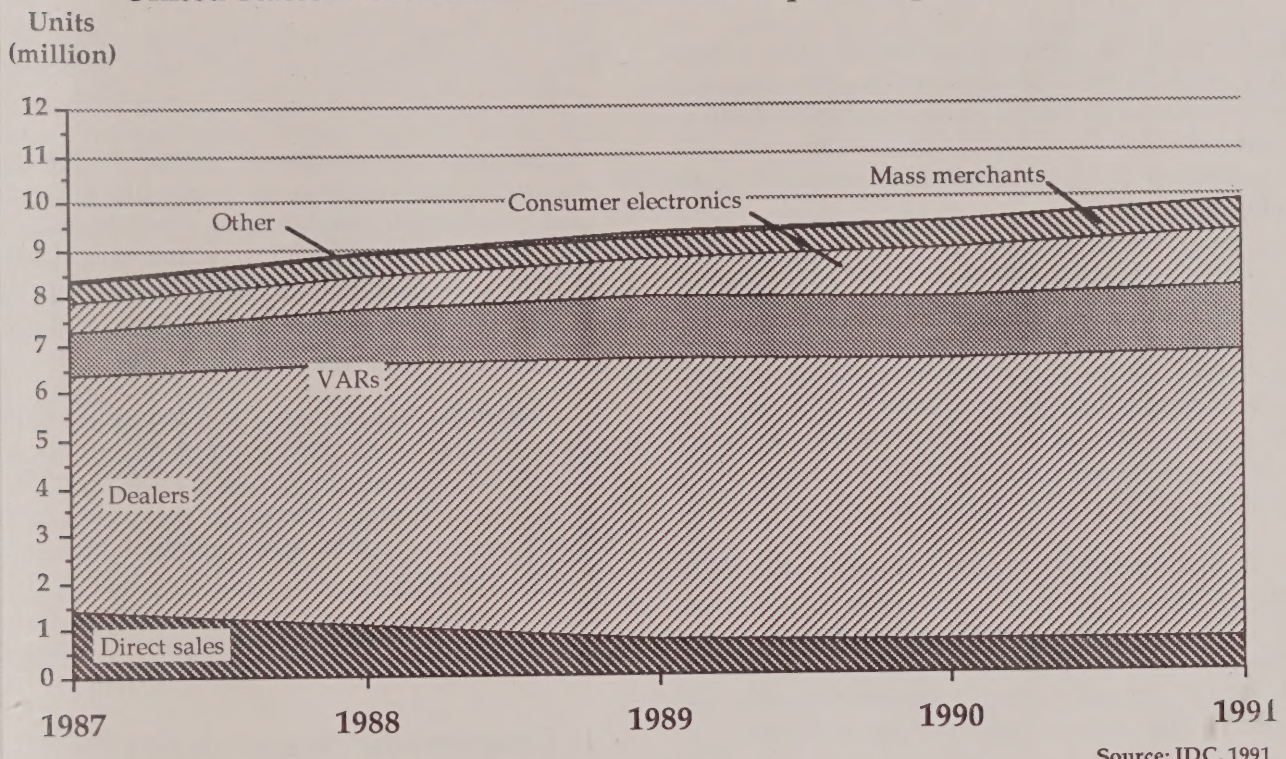
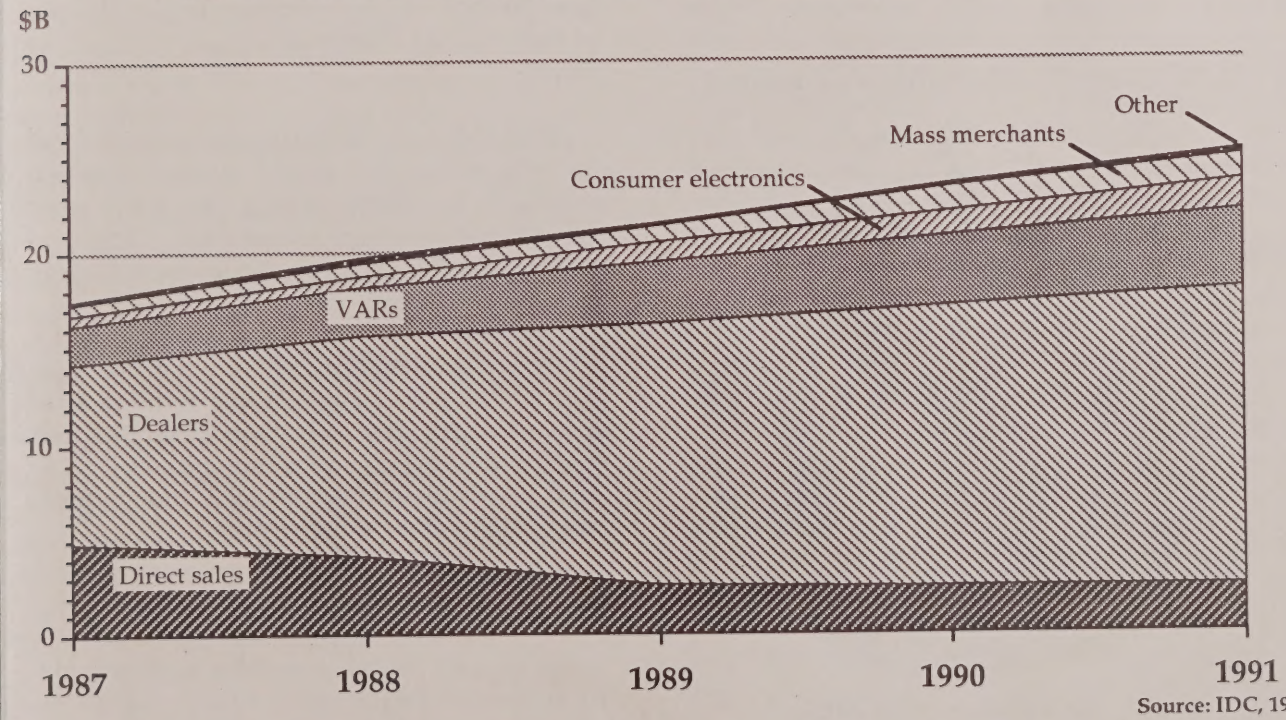
United States Distribution Channel Unit Shipment Splits, 1987-1991



Source: IDC, 1991

United States Distribution Channel Revenue Splits, 1987-1991



Source: IDC, 1991

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Mass Merchants' Differentiator: the Lawn Chair Litmus Test

Even in the computer industry few definitions are as slippery as PC channel segmentation. Just when you get a fix on it, a '386 in the Super Stop and Shop blows your cover. Now that's an alternative channel! IDC's Distribution Channels Research program offers the following guidelines.

Direct sales are those made by a manufacturer's sales force, agent or representative to the end user. For example, sales by a manufacturer through the use of direct response marketing are considered direct sales if the manufacturer maintains a corporate sales focus and ongoing relationships with customers. Any sale in which title is transferred from the manufacturer to a third party before being resold is not a direct sale.

Dealers typically have a storefront and do not add substantial tangible or unique value beyond support, training, price, availability or other services. Sales through a manufacturer-owned storefront are considered dealer sales. Sales though resellers who sell primarily through mail order are not included.

Distributors likewise add little value, but their sales efforts focus on other resellers, not end users. They sell, primarily on the basis of time and place utility, to other resellers, VARs and dealers.

Value added resellers (VARs) are non-retail, non-mail order organizations which take title to systems, and add tangible value by, for example, bundling proprietary software with a system to add value. Added value must represent a substantial proportion of the total, and must provide a specific solution or functionality (e.g., vertical application).

Computer superstores conduct their business through large, well-merchandised storefronts of at least 20,000 square feet. They offer at least 5,000 SKUs (stock keeping units) and generate at least 75% of their revenue from sales of computers and computer-related equipment.

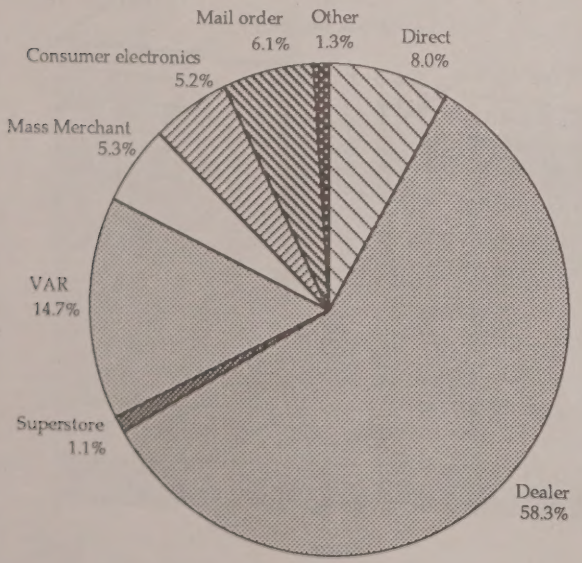
We identify two types of alternative channels of distribution:

Consumer electronics outlets typically carry a variety of electronic merchandise, including computers and office equipment. **Mass merchants** offer a wider range of merchandise, ranging from white goods to clothing. The distinction between the alternate channels can be confusing. Try this simple rule of thumb: if the retailer sells lawn chairs, it's a mass merchant.

Mail order, and mail order direct, sales are offered by both manufacturers and resellers that use the telephone for taking orders, providing customer support and performing marketing functions. Sales are supported by catalogs and frequent trade publication advertising.

Systems integrators provide a comprehensive information processing solution through a unique combination of professional services and expertise in hardware, software and communications technologies. SIs maintain full financial and performance responsibility for the entire project.

1990 PC Units by Distribution Channel



Total 1990 units: 9.4 million

Source: IDC, 1991

Distribution Strategies of Selected Leading PC Suppliers

Apple Computer: Third-party distribution is critical to Apple's success; over 75% of Apple's 1990 revenue was derived through indirect channels. The majority of that came through traditional dealers, but the relationship has not always been smooth. Dealers have claimed that Apple's direct sales named national account list was constantly changing. Recent efforts at recentralization promise to smooth out dealer relations: dealers will probably become more active partners with Apple and will play a greater role in supporting and developing national account marketing and sales strategies. Apple will also continue to branch out into alternative channels like mass merchants. Apple's alternative channels were opened up by last Fall's introduction of the Classic. However, because of its historic appeal to first-time computer buyers (who are more likely to shop dealers), continued emphasis on dealers is likely. End-user demand will ultimately decide which models will go through the alternative channels. Apple's history will only play a partial role.

Compaq: Describing Compaq's distribution strategy means hitting a moving target. Compaq has spent much of the last year creating expertise in the reseller channel to support a multiuser system — the Systempro. It now, in effect, has two businesses: PCs and servers. And the PC side is suddenly not looking much better than the systems side. Fighting to retain PC market share, Compaq recently announced a "marketing revolution" that looks to new distribution channels. The most notable component is two-tiered distribution; Compaq is now alone among the top three U.S. PC market share leaders with a two-tiered distribution system. Both IBM and Apple still rely on dealer-associated VAR programs to meet the needs of smaller VARs. Compaq's two-tiered program is probably only a stopgap measure; within six months it will probably roll out a true direct VAR program.

Dell Computer: Changing PC markets demand flexible distribution strategies. In the past two years, Dell has quietly restructured its already lean sales and distribution model. A pioneer of the PC mail order business five years ago, Dell delivered over 40% of its 1990 shipments through ongoing relationships with large customers, what IDC labels direct sales. Now it is selling systems through selected office supplies stores. The stores stock demo units only; orders are filled through the Dell warehouse. Without the additional onerous inventory problems, the retail location can keep the retail price in line with Dell's relatively inexpensive mail order business. Potential customers get a hands-on feel for the Dell PCs.

IBM: Few vendors seek to please so many resellers. Or so many end users. As a result, few PC suppliers support such a confusing array of single and multiple tier resellers. IBM's multifaceted distribution channels are dominated by traditional dealers. Some 77% of $5.2 billion in IBM's 1990 PC and PC peripheral sales (79% of 1.6 million PCs) was sold and delivered through the dealer channel. The remainder is accounted for by a mixture of VARs, direct sales, mass merchant sales. The breadth of IBM's product lines (the PS/1 and RS/6000s) has far-reaching implications. If the PS/1 is successfully sold through mass merchants, they could displace more traditional dealers. The obvious question: what about channel conflict? One IBM executive says: "a little channel conflict is good — it means my products are being actively sold. I would worry if I didn't see any conflict." In an effort to avoid duplicating Compaq's Systempro's lackluster performance, IBM has implemented a LAN VAR program targeting "high-end" LAN VARs.

Packard Bell has built a reputation for aggressively priced, full-featured PCs in the mass merchant and consumer electronics channels. Only one-third of Packard Bell's 1990 shipments were sold through dealers (compared with 58% industry-wide). The rest went through alternate channels. How's it done? Bundled: system, software, warranty, and a very liberal "no-questions-asked" 30-day return policy that's anathema to traditional dealers.

Sun Microsystems: Since 1987, Sun has undertaken a distribution transition aimed at expanding its channels to sell workstations outside its core scientific and technical markets. To that end, Sun has created a variety of third-party marketing programs ranging from vertically-focused VARs to retail. It employs a worldwide direct sales force of approximately 550 people (one-half of which is based in the United States). Some 400 U.S. Partnership OEMs target niche markets; 350 VARS and 100 National Value-Added Dealer outlets focus on smaller customers. Sun's VAR and OEM business will still largely be driven by application software and vertical market expertise. The NVAD business will be driven by off-the-shelf software and dealer integration capabilities.

— with Bill Manning

Consolidation Cause and Effect

Call it consolidation, call it a shakeout. Call it the penultimate symptom of industry maturity. Whatever the name, the word is out: fewer new buyers, fewer big purchases from existing users, heightened concerns about PC-users' productivity, and long-term compatibility questions dominate the computer industry. What results is a feeling of impending structural change in the composition of the industry.

Everywhere along the value chain companies are reevaluating their basic distinctive competence. Nothing less than the survival of large and small PC manufacturers, assemblers, repackagers and integrators, is at stake. Mergers. takeovers, partnerships: just how many PC companies can buyers support? And what kinds?

Back up a minute. Supplier consolidation is far from a sure thing. How many no-name assembly plants come on-line in any given month? For every established manufacturer that calls it quits (few come to mind ... ?), someone else is willing to pick up the slack. Someone willing to slice it a little closer to the bone: one foot on the gas, the other on the brake. That'll happen as long as PC components are inexpensive, and entry barriers remain low. Consolidation? Bahh. Despite slow growth, PCs remain an asset management game. Remember: excess profits attract competition. Since few PC companies have generated excess profits over the last twelve months, the mere perception of excess profits must too attract. For every exit, we'll still see at least another entrance.

On the other hand, reseller consolidation is already underway. As chronicled in these pages, the big are getting a bigger slice of the pie. The middle is getting squeezed. The question is: Will reseller consolidation change anything. WIll it accelerate supplier consolidation? Or, will it simply enable it. Restrain it? Could it possibly reverse it?

The single most significant entry barrier to selling PCs today is access to distribution channels and shelf space. Reseller consolidation in traditional PC channels (dealer, VAR) heightens that problem. New channels of distribution — mail order, computer superstores, mass merchants — provide some relief. But for every Dell that out-Compaqs Compaq, there's a "PCs To Go" ready to out-Dell Dell. Now, there are more types of channels but they are more competitive than ever.

So, despite the growth of alternative channels of distribution, market access remains constricted by overcrowding. While alternate channels are slowly but surely rendering the old distribution model obsolete, they change the need for focusing on market access. Personal computers are differentiated less by product features than by marketing and support services delivered by distribution channels. To succeed in the PC distribution business in 1991 means having a "shtick:" something you can do better than anyone else.

Back to the consolidation question. A paucity of means of getting PCs to customers might, possibly, provide clog enough to impel PC supplier consolidation. If suppliers had to compete head-to-head to be carried in one of only very few superstores, for example, consolidation might result. But constrained market access caused by *overcrowded* channels likely will not.

Respectfully,

Doug McG

THE GRAY SHEET
Computer Industry REPORT

DOUG McLEOD, EDITOR NOVEMBER 22, 1991 • VOL. 27, NO. 3 Published continuously since 1964.

Faster Product Transitions, Diverging End-User Markets Heighten OEM Winchester Competition

At least one statement holds as true today as it did eight years ago: "Given the availability of cheap computing power, low-cost storage and output devices are shaping up as the key factors in using the elasticity factor to maintain the boom in personal computing sales" (*Gray Sheet*, March 31, 1983).

Storage and output device prices have showed enormous decline: per-megabyte storage prices continue to drop 20% annually. Laser printers have dropped to the $500 range. Sales of PCs responded by growing at double-digit rates from 1983 through the end of the decade.

While another phase of such strong growth is unlikely, storage remains an important component of PC purchases. Between 15% and 20% of end-user systems spending on PC hardware is dedicated to disk storage. Over 90% of systems now include a hard disk drive (HDD), installed sometime before shipment to end user.

The demand for Winchester OEM disks themselves exhibits strong elasticity. Once the OEM price drops below $300, the drive becomes an acceptable option for inclusion on mainstream computers retailing for between (with appropriate markup) $1,000 and $3,000. As prices drop below $200, overall unit volumes begin to decline and systems manufacturers consider higher-capacity drives. Among the developments in OEM winchester HDD markets:

- In most product categories, four suppliers share well over 50% of the business. No one supplier is dominant across all of them.
- Japanese share of the OEM market appears stable, at between 10% and 15%.
- Demand for notebook-PC storage has been disappointing, as notebook PC sales remina lackluster. While notebook PC HDD suppliers continue down the cost curve, shipments remain disappointingly low. One result of the depressed demand: selected 2.5" segments will see overcapacity in the short term. Nonetheless, by 1994, 2.5" sales will surpass 3.5" sales and there will be no price premium for 2.5" drives.
- In 1991 over 13 million 40MB 3.5" drives will ship. The 3.5" markets will become increasingly fragmented. Each of several capacity points — 80-, 105-, 120- and 160MB — will be smaller relative to current 40MB shipments.
- In 1991, 5.25" drives will account for only 10% of total industry volume. The 5.25" form factor accounts for a greater proportion of revenue, 23% in 1991. Shipments of 5.25" drives under 1GB will flatten and decrease starting in 1992.
- Captive shipments (units manufactured and internally shipped by an OEM computer manufacturer on host systems) data is largely a reflection of IBM. No other systems supplier produces the quantity of units as IBM. No other supplier even approaches the commitment to vertical integration that IBM does.

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IDC INTERNATIONAL DATA CORPORATION
5 Speen Street, Framingham, MA 01701 / (508) 872-8200

OEM Winchester Market: How Big and How Much Longer?

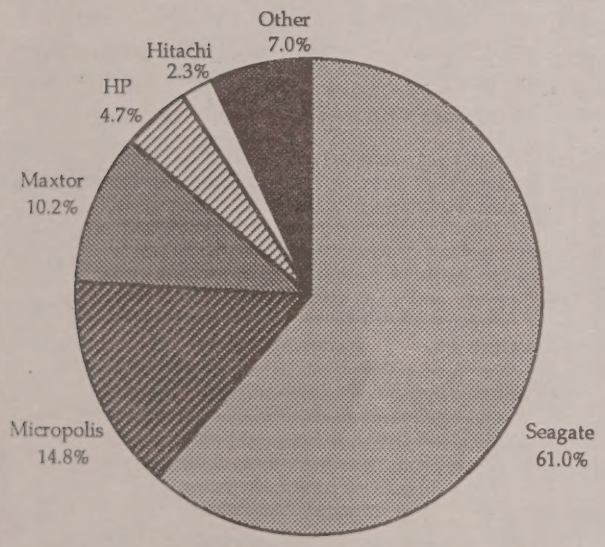
The $12 billion OEM disk drive market grew 18% in 1991. Unit shipments grew 22% over 1990 to over 34 million drives. Few sectors of the economy grew as quickly. Even fewer grew faster.

The disk drive industry is a derived demand industry. Sales opportunities are created at the computer systems level. Prior to 1990, annual computer system shipments exceeded drive shipments. In the future, HDD growth will exceed systems growth for three reasons: increasing plug rates (over 90% in 1991), growth in aftermarket sales (replacements, most notably), and the emergence of arrays and noncomputer applications. Composite unit growth will continue strong through at least 1994.

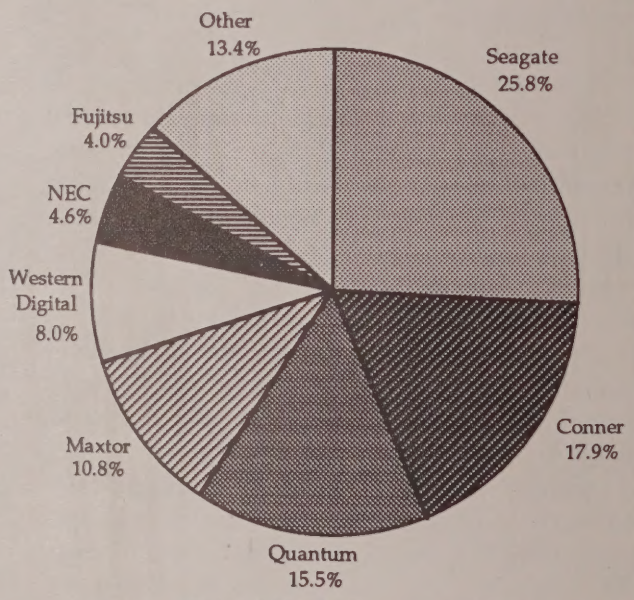
Supplier revenues will not grow as quickly. Per-megabyte disk drive prices are dropping 20% annually and may be doing so at an accelerated rate. Thus far in 1991, the average annual rate of decline has been in the 22-23% range. Beyond simply exposing suppliers to serious margin pressure, continued price declines depress overall revenue opportunities. Nonetheless, revenue growth will continue to surpass all but the fastest growing segments of the industry.

—with Crawford Del Prete, Alexa McCloughan

Worldwide 1991 Market Share, 3.5" and 5.25 Form Factors



Total 1991 5.25" noncaptive units: 2.5 million



Total 1991 3.5" noncaptive units: 5.7 million

Source: IDC, 1991

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DASD in 1991: 3390 Competition Causing Price Cuts

OEM winchester isn't the only disk market. Just the biggest. In 1991 over $5 billion of direct access storage devices (DASD) for IBM mainframes will be shipped throughout the world by IBM and its plug compatible competitors. In addition, that does not include another one billion dollars in disk-drive controllers.

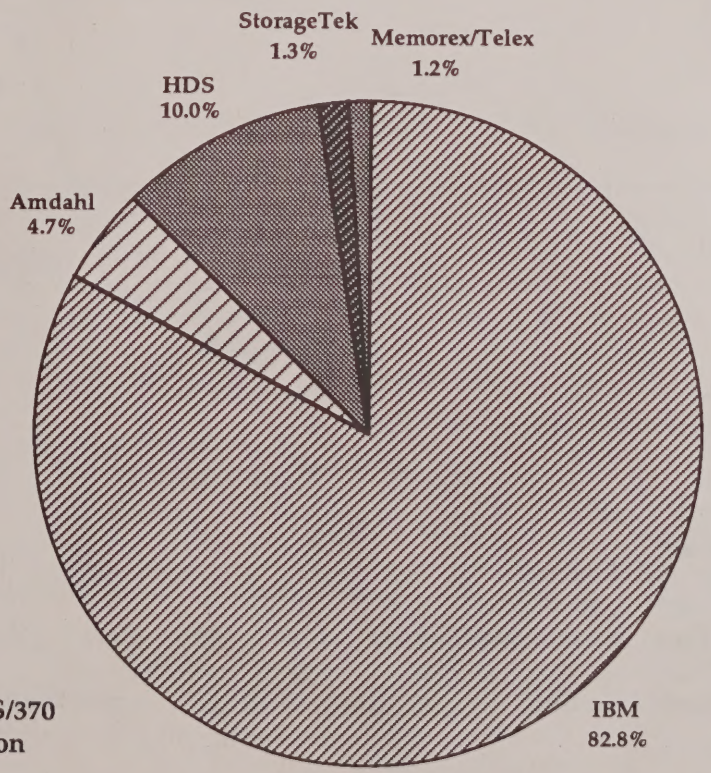
It's a safe bet that IBM's share of those DASD revenues won't save the company this year. In 1990, strong DASD sales offset sluggish mainframe sales. But throughout 1991, competition from 3390 compatibles has been putting significant revenue and margin pressure on IBM.

Most notably, Hitachi Data Systems' 3390-compatible 7390 DASD has been shipping in volume throughout most of the year. But it has not been a particualrly easy process for HDS. It is currently supply constrained on 7390s; lead times are as long as 120 days. Once customers choose HDS storage, they face a long wait. As a result, HDS may face some backlash from customers dependent on them for storage products. And some of those customers may bite the bullet and buy from IBM, for a price premium and thirty day delivery.

In September, IBM countered HDS' strong 3390 presence by announcing the 3390 Model 3, which began volume shipments early in the fourth quarter. Approximately 2,500 will ship by February 1992.

Meanwhile, Amdahl continues to experience trouble with its 6100 controller. Additionally, it has been forced to delay shipments of its 3390 response, the 6390, until the second quarter of 1992.

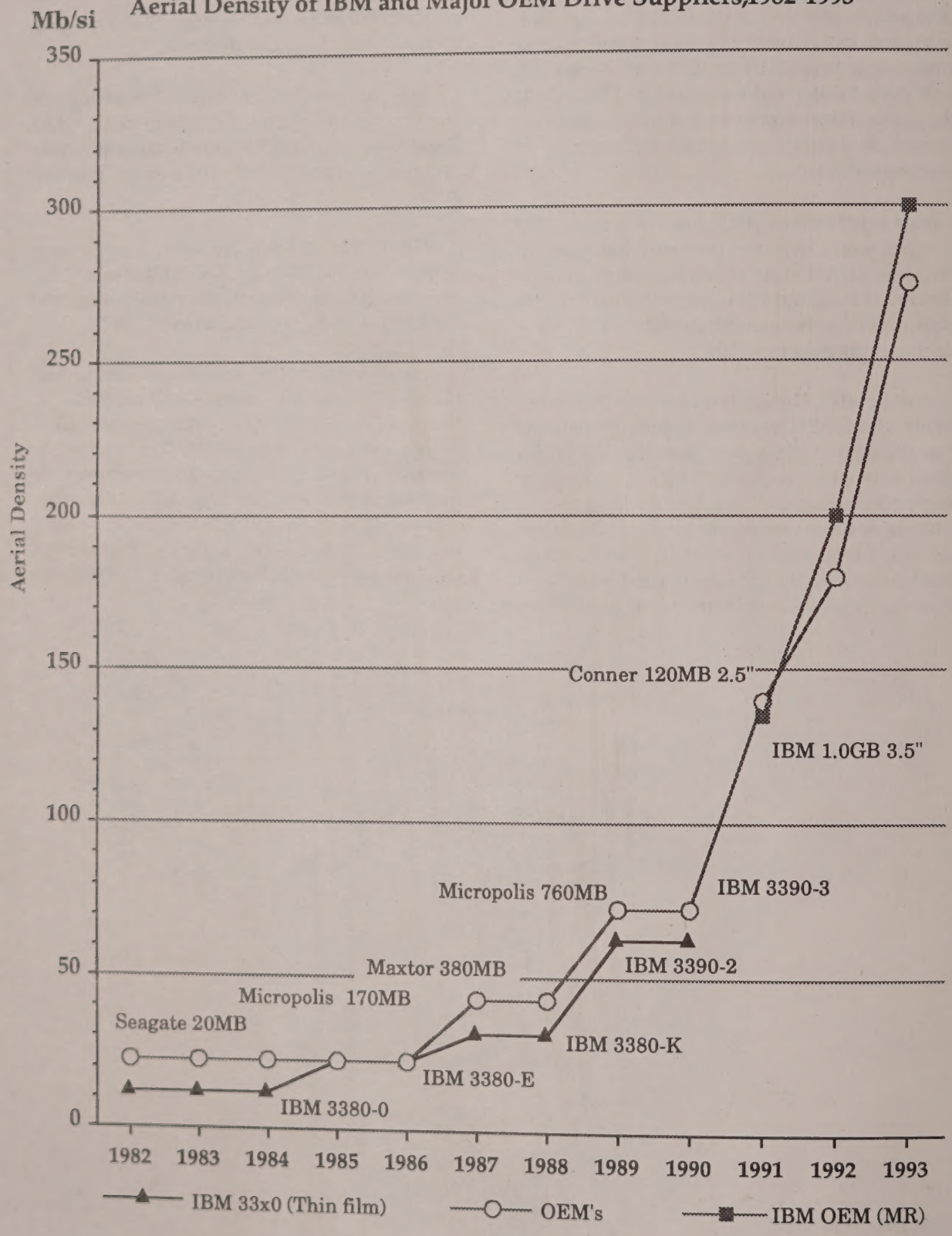
In the long term, IBM's most significant competition will likely come from RAID products like StorageTek's Iceberg development effort. StorageTek's's fault-tolerant RAID product will be officially announced in January, with volume shipments expected in the third quarter of 1992. IBM's current plans call for a response to Iceberg in 1993 or 1994. If it is delayed significantly, IBM may stall by announcing another iteration of 3390 technology.



1991 Worldwide S/370 DASD: $5 billion

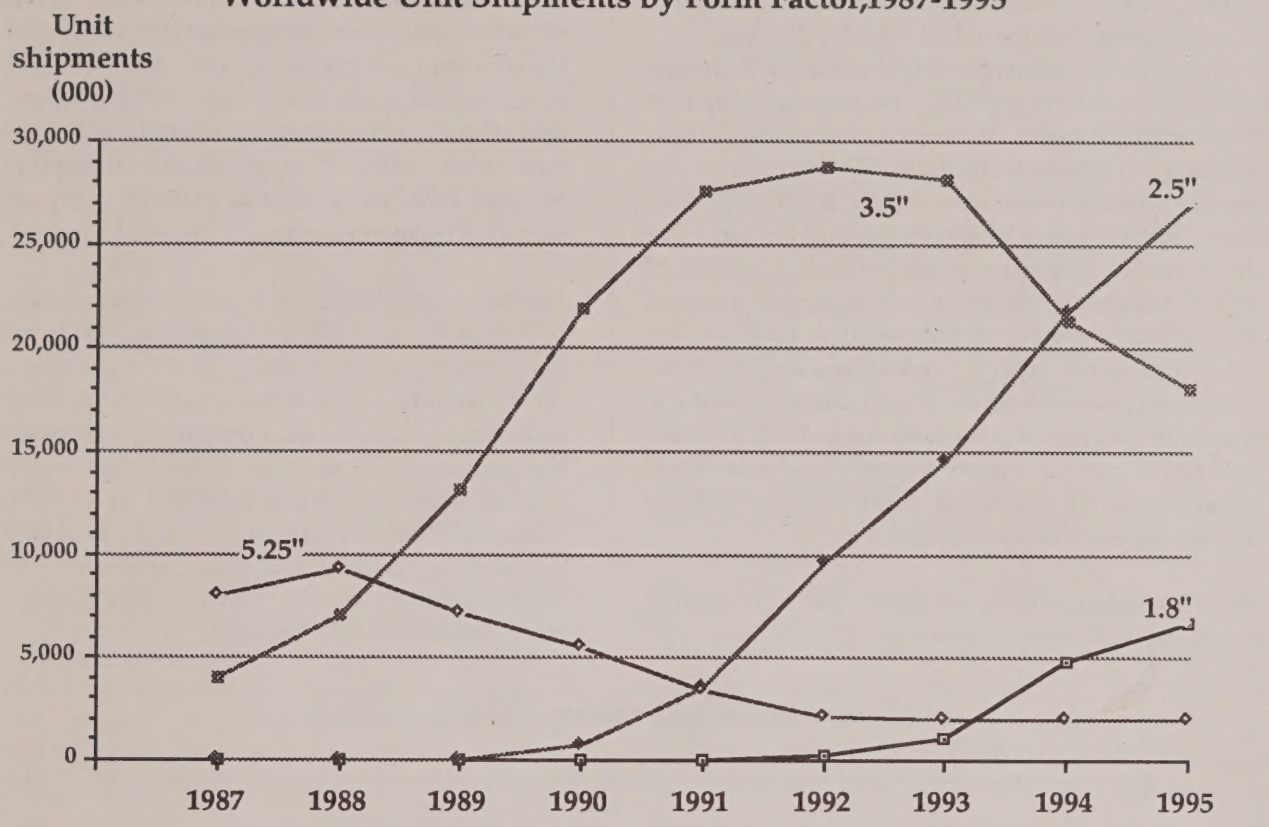
Source: IDC, 1991

Aerial Density of IBM and Major OEM Drive Suppliers,1982-1993



Source: IDC, 1991

Worldwide Unit Shipments by Form Factor,1987-1995



Source: IDC, 1991

IBM Debuts MR Heads in New 3.5" Drives at Comdex

IBM captured much attention at Comdex with a "technology preview" of 3.5" 1.6GB (SCSI) formatted and 2.0GB (IPI) unformatted drives. The company was quick to point out that the drives will not ship until 1993, but they were the second and third products announced this year that rely on internally sourced magnetoresistive (MR) head technology.

Over the past nine years, OEM disk manufacturers have outpaced the IBM 3380/90 30%-growth-per-year thin-film, aerial-density (AD) increases. However, with the latest 3390-3 announcement, IBM has only increased AD by 25%. The OEM makers may face a similar slowing.

What are their options? They can rely on current head suppliers (Dastek, Read-Rite, and Applied Magnetics) to develop MR technology. They can wait for MR expertise from experienced captive disk drive suppliers like Digital and Hitachi to diffuse outward. Or, they can hope that alternative technologies (vertical recording, data compression) can duplicate or surpass MR's advances.

Since 1985, OEM disk makers have been more willing to sacrifice early production yields for high ADs in comparison to IBM. IBM has been unwilling to keep pace because of the resulting poor cost controls, and because IBM must keep 33X0 track lengths constant. However, if IBM can successfully integrate MR heads into mainstream 2.5", 3.5" and 5.25" products before OEMs can develop competitive AD alternate technology, IBM may hold as much as an eight-month lead over them.

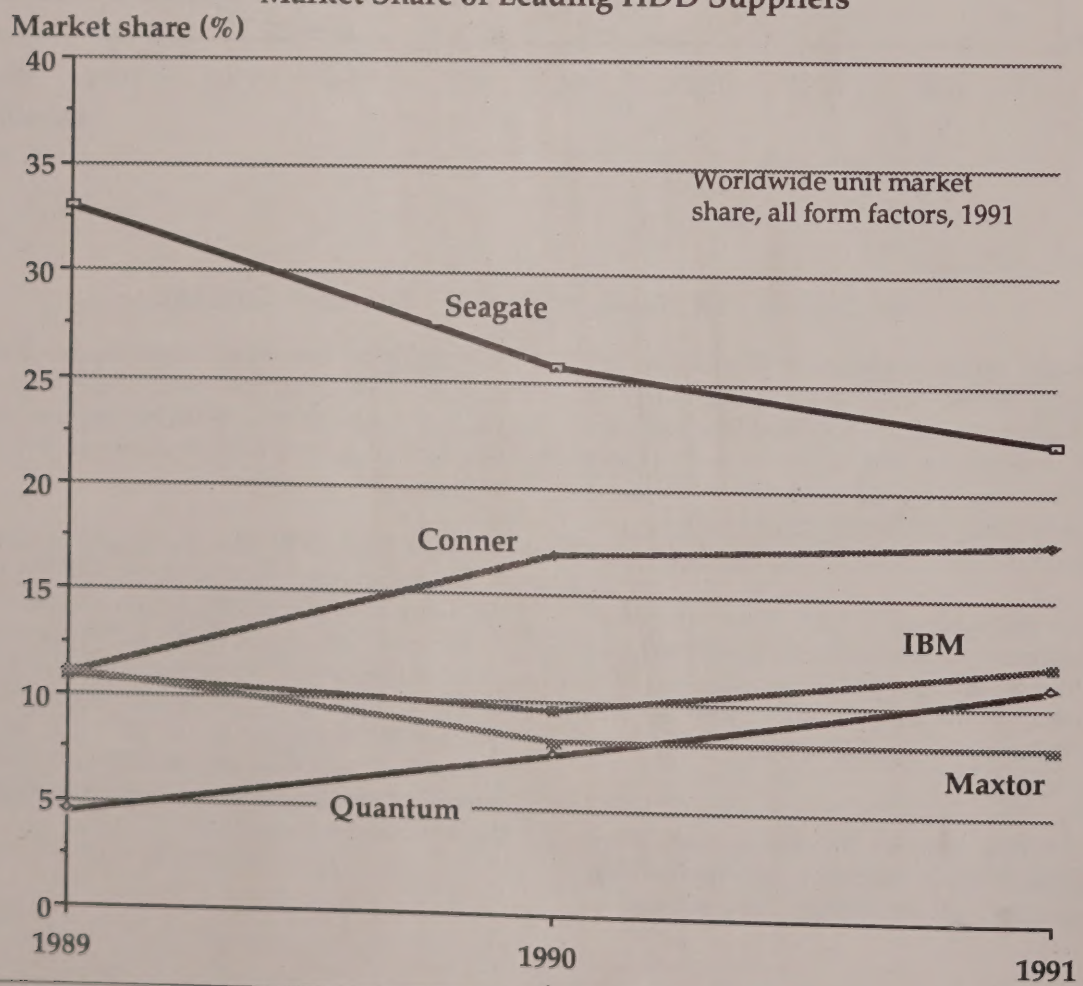
Profiles of Leading Storage Suppliers

Conner Peripherals is a resource-rich company with strong products, technology and financial flexibility. It will account for over 17% of 2.5", 3.5" and 5.25" captive and noncaptive disks shipped in 1992. Conner continues to dominate 2.5" markets, although its dominance is shifting. Increasing competition in low-capacity 2.5" markets decreased Conner's share, although unit shipments rose. At higher 2.5" capacities, the company increased shipments and market share dramatically. Overall, Conner controls over 50% of all 2.5" markets, and remains strong in 3.5" markets. As a result, Conner continues to grow. Nonetheless, the company has recently announced an 8% worldwide headcount reduction. It will probably focus on two strategies to fuel a turnaround in 1992: differentiate future products more strongly, and take better advantage of the breadth of its product line to target opportunities with new customers.

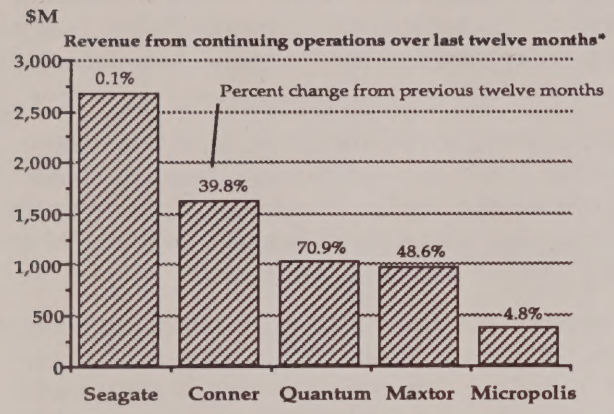
IBM showed surprising strength in 1991, rebounding to almost 12% market share in 2.5", 3.5" and 5.25" captive and noncaptive disk markets from a poor (9.5%) 1990. IBM's captive shipments dwarf those of all other systems manufacturers. This fall, IBM was the first supplier to ship 1GB 3.5" drives. In addition to leading-edge technology (see *"MR Heads,"* pp. 4, 5) and at least a three-month time-to-market advantage over other 1MB 3.5" suppliers like Micropolis and Seagate, IBM has priced that drive at a very aggressive $1,470, quantity one.

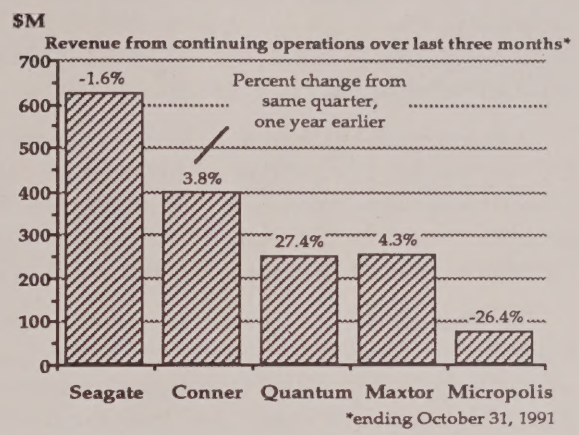
Digital entered the OEM business this fall with new 3.5" 855MB and 5.25" 2.0GB drives. While neither drive represents an industry first for capacity, both offer visibility to much more sophisticated features and migration paths than previously expected from the company. To succeed in OEM drive markets Digital needs to gain a foothold in distribution channels. Then it must sell and sign a major OEM contract and continue to offer customers a logical migration path at or ahead of other OEMs with competitive cost/MB drives.

Market Share of Leading HDD Suppliers



Financial Performance of Leading Storage Suppliers ($000)





Quantum, which now holds 11% of the OEM disk business, wants to be more than just a major supplier of drives to Apple. With a broad array of new products announced this month — from 2.5" 120MB to 3.5" 1GB disks — it is well-positioned to gain share over the next 12 months. Most notably, the new products enable penetration into new markets. Quantum can now challenge Conner in 2.5" markets, and Seagate, Maxtor and Micropolis in the 3.5" 1GB market. It is now shipping roughly on a par with 2.5" leader Conner, and has reduced its time-to-market gap relative to 3.5" leaders.

Maxtor's share of 2.5", 3.5" and 5.25" captive and noncaptive disk markets continues to decline, from 11% in 1989 to 8% the last two years. The company's strengths lie in high-capacity drives, but it holds an increasingly tenuous position in 300-499MB, and 500-999MB 5.25", and over 1GB 3.5" segments. Its line of 5.25" drives is getting old. Replacing these drives is proving problematic.

Micropolis continues to struggle to deliver a sustained recovery in sales and profitability. Despite a leadership position in 1GB 3.5" and 5.25" markets, its products appeal to a limited customer base. Heightened competition at Micropolis's major customer, Sun Microsystems, and softness at Digital, Siemens and Bull, as well as in the 760MB market, have added to the company's recent problems, resulting in a string of losing quarters. Micropolis is placing its emphasis on two types of products to drive a turnaround in 1992: RAID and over-1GB drives. The company recently launched its RAID product line with the RAIDion disk array. While revenue won't hit until the beginning of 1992, it is the first non-OEM focused disk array on the market. Micropolis (30% of over 1GB drives) will meet stiff competition from Seagate (51%) as it attempts to increase market share with five new drives (four 5.25", one 3.5") in 1992.

Seagate continues its strong performance in the high end of the market. It is the overall 2.5", 3.5" and 5.25" captive- and noncaptive disk market leader, capturing 22% of 1991 shipments. The recently announced 3.5" 200-500MB (1" high — a new standard) drives are industry leaders. Seagate has at least a three-month lead over its closest rivals, and a good track record of ramping production following announcements. But it has severe profitability problems with its under-100MB products. Seagate's major short-term challenge is to ramp worldwide production as the company moves to rely increasingly on low-end products.

Western Digital is experiencing profitability problems as it attempts to move from second-tier 3.5" to mainstream 2.5" supplier. At yearend, the company will be close to a leadership position in only one market segment: under 30MB 3.5" drives, a segment that is expected to dwindle in 1992. The company is pegging its hopes on two recently announced 2.5" drives: 40MB and 80MB. The success of the 80MB product will be particularly important for Western Digital since that will be the volume 2.5" capacity point in 1992. At least two obstacles remain: transitioning the 2.5" drives to offshore production, and the company's poor financial condition. Western Digital's abandonment of efforts to be a broad-based supplier and focus on specific, growing market segments is likely to keep the company competitive from a time-to-market standpoint.

Adding Value the American Way

Five years ago, popular consensus held that the United States' dominance in the business of manufacturing disk drives was dying, going the way of U.S. expertise in semiconductor manufacturing. In five years — by now — suppliers in Japan and other East Asian countries were supposed to have monopolized worldwide disk-drive manufacturing.

It hasn't quite happened. At least, not as simply as just giving away production leadership to non-U.S. companies. The good news in the United States is that U.S.-based suppliers still dominate worldwide disk-drive markets. The largest Japanese disk-drive supplier, NEC, has lost market share over the past three years. In 1989 it held 7.6%, in 1991 6.2%. The top four companies — Seagate, Conner, IBM and Quantum— all based in the U.S., held 59.8% of 2.5", 3.5" and 5.25" drive markets in 1991.

But how good is it? About 90% of the average "American" disk drive is assembled from components manufactured elsewhere. Only IBM, Digital, Quantum, Seagate and Hewlett-Packard operate volume assembly facilities in the United States; practically all "American" drives are built outside the United States. The only thing American about them is the location of the home base of the company that arranged to have the drives built. That is, the company that designed the drives, chose component suppliers, negotiated supplier and manufacturer contracts, and found some buyers for the drives, is American. Drives are conceived and designed here. Prototypes are built here while production facilities are tested and debugged. Then, when quality levels are high enough, the manufacturing is thrown over to offshore, low-cost producers.

Contrast the disk-drive model with semiconductors, specifically DRAM. Virtually every process of DRAM design and manufacturing is owned by non-U.S. companies. The top three worldwide DRAM suppliers — Toshiba, NEC, Samsung — are East Asian. Texas Instruments holds the fourth position, and is followed by Hitachi, Fujitsu and Mitsubishi. IBM, which remains among the largest DRAM producers, uses all its DRAM manufacturing capacity for its own systems.

What are the fundamental differences between the two businesses? For one, memory is memory. Most memory customers seek the same types of products: more memory drawing less power in a smaller space. That means bigger, more homogeneous markets. Disk-drive manufacturers' customers have varying needs. Systems companies need huge capacities and lightning-fast performance rates. Workstation suppliers don't need quite as much of either. Personal computer suppliers need even less. Suppliers of laptop and notebook PCs are primarily concerned with power requirements, weight and form factor. The result is that being a little closer to customers greatly enhances drive makers' ability to differentiate and deliver products.

Can U.S.-based hard-disk suppliers remain strong international competitors? Yes. As long as they are able to leverage two distinctive advantages: proximity to the marketplace, and ability to quickly respond. If disk-drive technologies (then, end-user markets) continue shifting with great speed, U.S.-based suppliers will remain strong. One strategy foreign companies (most notably, Japanese) have successfully used to enter DRAM and mainframe markets — aiming for a specific four-year price/performance, form-factor target, and then raising a few billion dollars to develop the product — won't work. End-user markets change too quickly. The potential to get burned — when those changes throw the target off plan, and the R&D funding is wasted — is high. The risk is great. The same holds true for computer systems. Look at workstations, for example. Rapid technology turnover has resulted in ongoing success for U.S.-based companies.

How much longer, then, can U.S.-based technology companies remain competitive? It seems reasonably certain the uncertainty will continue for several years. However, should the rate of technological change slow down, the strong financial and manufacturing assets of Japanese companies would be more meaningful, perhaps decisive.

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR DECEMBER 6, 1991 • VOL. 27, NO. 4 Published continuously since 1964.

What Will the Structure of the IT Industry Look Like in the Year 2000 — Dis-integration and Maturation

The recent organizational changes at IBM are being closely watched by industry participants in many sectors. To help put these events in context, we offer the following excerpts from a speech given by David Moschella, senior vice president for worldwide research, at IDC's recent "European IT Forum" held in Venice, September 25-27.

During the 27 years which International Data Corporation (IDC), publisher of the *Gray Sheet*, has been tracking the global IT industry, there has never been so much discussion concerning the general question of where our industry is headed. Nor has there ever been so much speculation regarding which business models are most likely to assure future success.

More often than not the confusion has been attributed to the injection of industry standards into an already highly competitive marketplace. Certainly, the so-called open systems movement has been unsettling, and indeed it has dominated tactical behavior over the last three years.

However, IDC believes that open systems are only a part of the story, and that there are actually deeper, and much more powerful forces at work. The computer industry is going through a process quite similar to the patterns of more mature industrial sectors. We expect that when the current dust finally settles, our industry will look very different than today, but its structure will be much less unique than many of us have been prone to believe.

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Dis-integration of the Computer Industry

In order to confine the scope of investigation, we will focus on three main questions:

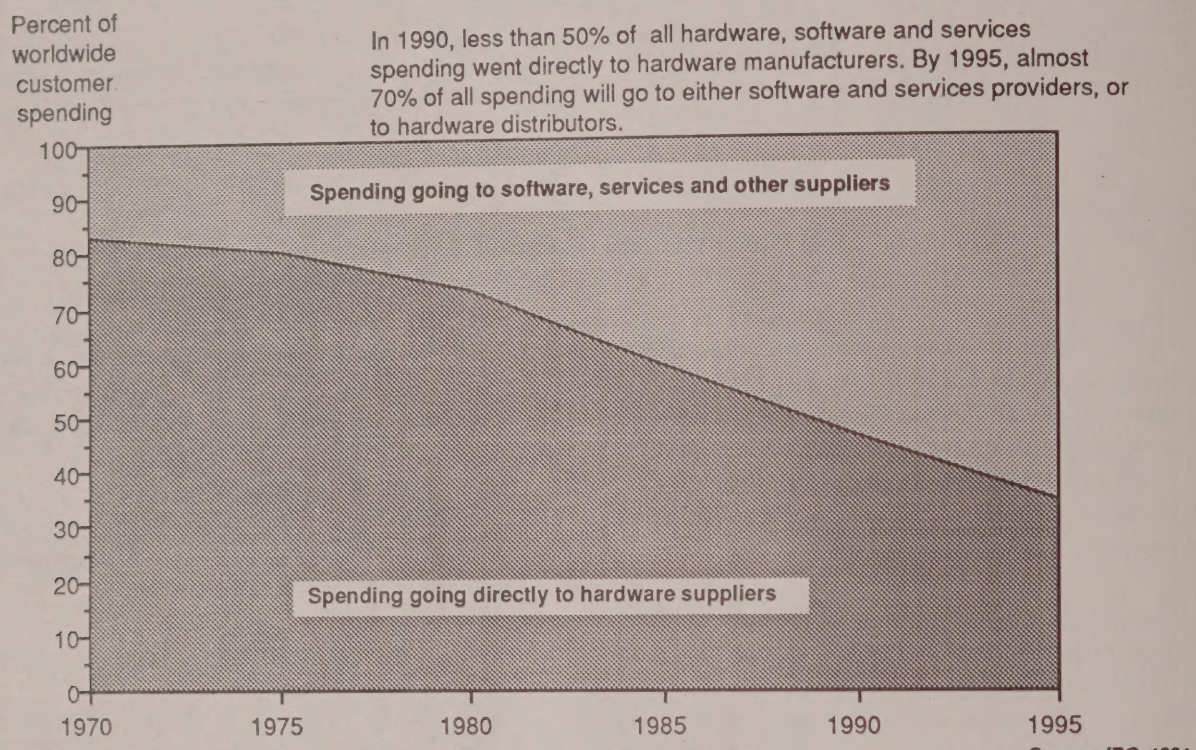
- Why is a new industry structure evolving?
- What will this structure look like? More specifically, what types of companies will comprise the IT business? How many of them will there be? What will be the mix of hardware, software, and services revenues?
- What can be learned from studying the trends and patterns in other more mature industries?

The essence of our thinking can be summarized as follows:

Increasingly, the business of manufacturing computer hardware and key systems software tools and utilities is becoming distinct from the business of providing customers with integrated business solutions. Each of these two business models have unique requirements that cannot be easily combined into a single vertically integrated corporation.

We are labeling this phenomena "the dis-integration" of the computer industry. By this we mean that the vertically integrated hardware, software, and services structure that has dominated the first 40 years of IT is now giving way to a new model which will be distinctly not integrated.

The Dis-intregration is Already Underway ...



This new structure will be characterized by two types of companies: those that specialize in building the best hardware and software platforms possible, and those that use those tools to deliver value (generally service and solutions) to customers. Companies that do one will as a rule not do much of the other.

This movement is already underway. A rapidly declining percent of customer's hardware, software, and service spending already goes directly to hardware manufacturers. By 1995, 70% of all spending will go to either a software and service provider, or some sort of hardware intermediary—a VAR, dealer, used equipment provider, etc. Hardware builders are increasingly losing direct contact with their ultimate customers *(see above chart)*.

The table on page three shows how vendors are reacting to this change. The column on the left lists the base technology providers. This group fulfills three primary functions: components, systems hardware, and system and utility software.

On the right are companies that deal directly with customers, ideally using the best tools available. In contemporary parlance, these might well be called "computerless computer companies. " Notice that this group includes in-house MIS resources.

In the middle, are the major vertically integrated companies. This list comprises what is commonly viewed as the "computer systems industry."

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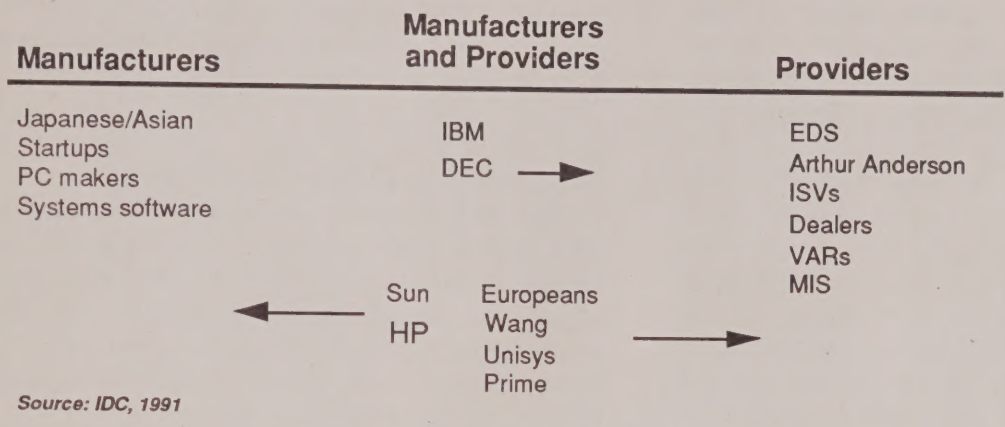
How Are Major Suppliers Responding?



Source: IDC, 1991

From this perspective, two trends are clear: first, the much talked-about industry crisis is largely confined to traditional systems manufacturers (in the center) — the base technology, and service providers (on either end) are doing well. Second, traditional systems suppliers are being forced to move to one of the two extremes, often with difficulty.

Viewed in this light, several industry trends become apparent. First and foremost is that the much talked about industry crisis is in fact largely confined to the traditional systems manufacturers. On average, both the base technology group—Intel, Microsoft, the Japanese, etc.—and the service providers—EDS, Arthur Andersen, etc. are generating solid financial results.

Secondly, the traditional systems companies are in most cases either choosing or being forced to move to one extreme or the other. (IBM is somewhat of an exception and will be discussed later.)

Certainly, companies such as Wang, Prime, and virtually all of the major European companies have largely given up on the idea of developing their own hardware platforms, and are rapidly trying to reposition themselves as service providers. Even DEC has been relying on non-DEC platforms.

On the other hand, several major U.S. systems companies seem to see their fate lying on the other side of the fence. Sun, HP, and Apple are primarily focussing on being world class providers of base hardware and software technologies, and are less interested in becoming professional services firms. In some ways, Sun's recent reorganization was its own little dis-integration, preparing the company to compete separately on both the hardware and systems software front.

The major exception, of course, is IBM. In our view, IBM will be one of the few, perhaps the only U.S. company to continue to compete in both core technologies and service provision. (For a variety of reasons, the Japanese suppliers are likely to remain vertically integrated in their domestic market for some time to come.)

Today, IBM is acting as if it wants to compete on all three fronts. It is increasingly acting like at OEM platform provider — witness the deals with Apple, Wang, Motorola, and its various OEM disk activities. It continues its vertically integrated strategy, perhaps best symbolized by SAA. And it is quite aggressive in the systems integration business.

The transition for all the systems companies is proving quite difficult. Ultimately, whether each vendor successfully manages it or not will depend on its ability to understand and react to the changing business model. What worked in the vertically integrated past will not work in the disintegrated future.

Reasons for the Change

To better understand these emerging models, we will focus on three key aspects of the disintegration process:

- Enhancing the rate of innovation
- Improving the focus on customer needs
- Patterns within other major industrial sectors

Points one and two are relatively straightforward. The vertically integrated structure of the past clearly had the effect of retarding innovation. Since vendors had semi-monopoly control over both their customers and the key technologies within their own envi-

ronment, they often could introduce new products according to profit maximization rather than competitive criteria. Additionally, the world's R&D resources were highly fragmented and often redundant, diminishing overall innovation efficiency.

Industry standards, have been of course, a key part of this reformation process, and all of the above has often been discussed within the open systems context. But although standards have helped break down the old vertically oriented proprietary model, they don't necessary lead to a disintegrated industry. Indeed, many companies today are basically trying to approach the market with a vertically oriented open systems strategy, most often without success.

Ultimately, it is the needs of the customer that are driving the transformation of the industry. Simply put, the old vertically integrated model simply cannot meet the increasingly specialized requirements of today's customers.

Imagine a typical large corporation. At headquarters is a S/370 mainframe; the R&D unit is a heavy user of Sun workstations; marketing has gone with Macintoshes; manufacturing has an MRP system from HP; while the company's Japanese partner (and minority shareholder) is commited to a variety of machines from NEC.

Such a company needs an integrated information architecture, but none of the five systems houses it deals with has a business model and strategy capable of fully supporting all of its requirements. In evaluating its need for a long term strategic partner, the company's short list includes EDS, Arthur Andersen, and Computer Science Corp.

The lesson is that no one company, not even IBM, can make all the specialized products its customers need, and yet no system vendor takes a fully product-neutral stance to the customer. Inevitably, each system vendor has had a bias to its own product suite. For large customers with complex requirements the system vendors' approach is becoming increasingly unattractive.

Perhaps equally importantly, no one manufacturing organization, including IBM's, can meet the needs of a parent company that wants access to the best and most timely technology. Waiting for in- house resources to develop and manufacture the required products is an inefficient and unnecessary bottleneck that ultimately becomes a competitive disadvantage.

Patterns from Other Industries

Perhaps the easiest way to appreciate the long term impact of disintegration is by examining the structure of other industries in which this pattern has already taken hold. Three such industries are consumer electronics, transportation and telecommunications. Each is, in IDC's view, strongly analagous to various aspects of the IT industry.

Consumer electronics is an obvious case where vertical hardware, software and service integration is virtually non-existent. Not only do the hardware vendors not create software or service — can you imagine Sony creating the Simpsons? — but as a rule the service vendors (i.e. TV and radio networks) don't build software either.

Although the current structure is clear, it was not always so. In the early days of television RCA was both a hardware, software, and service provider. Furthermore, looking forward Sony's efforts to buy up Columbia pictures and Michael Jackson may well be an attempt to reestablish a vertical presence through a hardware generated financial surplus.

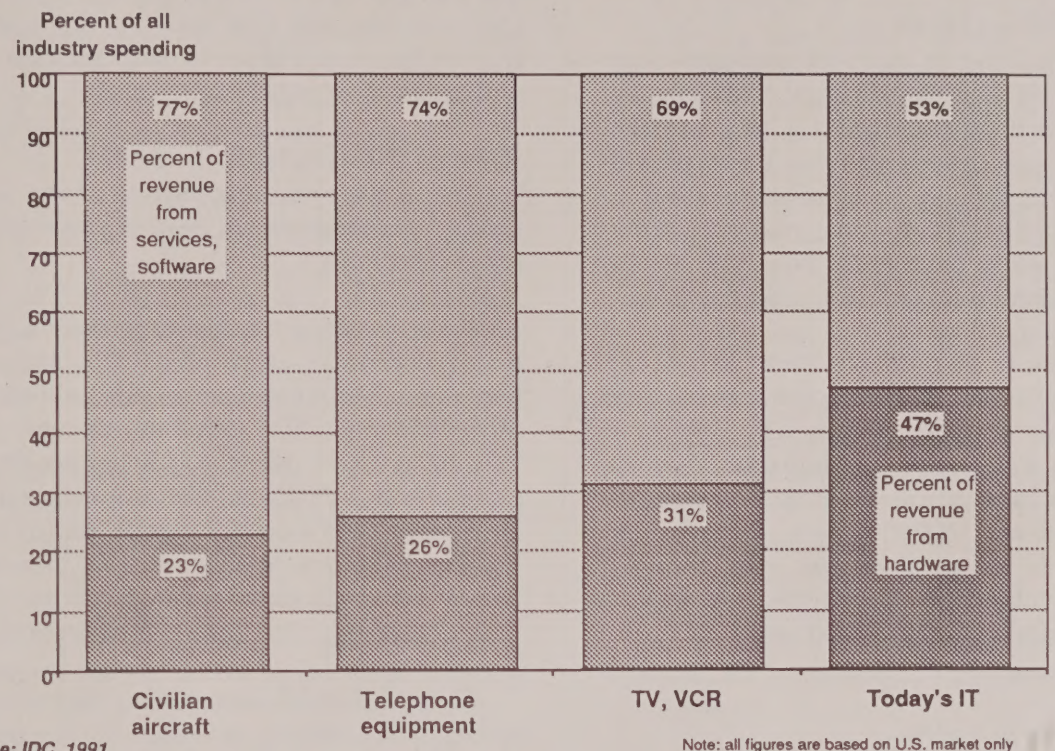
Since it encompasses a variety of industrial and consumer sectors, the transportation industry represents an interesting model for comparison. Again, the industry is highly disintegrated.

In many ways, Boeing has a position in airplanes similar to what IBM has in mainframes. (Indeed, the word "mainframe" was largely derived from the term "airframe".) Yet we would think it quite strange if Boeing were to suddenly enter the airline business.

At the consumer level, automobile manufacturers long ago realized that they could not be competitive in running either their own dealerships or service divisions.

Finally, the telecommunications business was chosen because of the close integration of advanced hardware and software technologies. Again, the

IT's Service Revenue Proportion is Lower Than Other Industrial Sectors



Source: IDC, 1991

Note: all figures are based on U.S. market only

pattern of dis-integration is largely in place, as the major local and long distance carriers tend not to make the hardware they rely on.

It is worth noting that until relatively recently, this was not the case. For much of its history, the global telephone industry was highly integrated, and in fact was granted a legal monopoly that preserved that structure. But as soon as that monopoly ended, the process of disintegration rapidly took hold. Although AT&T may still make a lot of hardware, newcomers such as MCI and Sprint have largely adopted a disintegrated business model. Today, the world's leading telephone equipment supplier is the French firm, Alcatel, which is not in the telephone services business at all.

Lessons from Other Industries

Although it can be dangerous to push any analogy too far, the patterns indicated by these other sectors are plausible enough to warrant close attention. We will focus on five.

- Hardware, software, and services revenue distribution
- Sources of innovation
- Number of hardware vs.. software/service providers
- Role of distribution channels
- Issues of national control

Industry Revenues

The above figure shows the rough distribution of industry revenues for the four industries in question. The IT data is IDC's; the other figures were drawn largely from the 1991 U.S. Industrial Outlook. Largely because of definitional issues, the data for the non-IT sectors is surprisingly hard to pin down, and these estimates are admittedly rough.

Nevertheless, the pattern is clear. In all three cases, hardware comprises somewhere between one-third and one-quarter of industry revenues. In other words, U.S. airlines in total do nearly three times the domestic, non-military business than Boeing, McDonell Douglas and other civilian aircraft makers do. The IT industry is well on its way to a similar revenue mix.

Sources of Innovation

Although the share of business accounted for by hardware is shrinking, the analysis of other industries suggests that hardware will still be a powerful industry force and at least an equal partner in providing the technological innovation that drives an industry. Look at what CD-players have done for music; VCRs for video; four wheel drive vehicles for automobiles, fiber optics for communications, etc.

Although hardware does over time take on commodity properties, so, of course, can service. How much difference is their between U.S. airlines, or between using AT&T vs. MCI? More often than not, it has been new hardware that has taken other industries to new plateaus. HDTV, voice synthesizers, parallel processors, optical disks and other emerging hardware technologies will continue to give software and service providers new and important tools to work with.

Number of providers

An even stronger pattern emerges when one examines the industrial structure of the three industries in question. In each case, the number of mainstream hardware providers is dwarfed by the those on the software and/or services sector. The best example would probably be automobiles where some 25 manufacturers are supported by literally hundreds of thousands of service organizations.

This is not to say that IDC forecasts a quick consolidation of hardware vendors. This will not happen until the rapid rate of hardware innovation slows, and this won't occur until at least late in the decade, and probably well after that. For the rest of this century the number of worldwide hardware vendors will decline only moderately if at all.

Role of distribution channels

One of the intriguing aspects of the shift to a disintegrated industry, is the changing role of distribution channels.

The lesson from the other industries seems to be that in consumer industries — TVs, autos, etc. — hardware distribution channels are rarely a decisive aspect of competition. Certainly, Japanese cars and TVs did not take over the U.S. market because of more effective channels. The channels were by an large identical to their U.S. competitors; it was their superior hardware products that won the day. The current decline in the relative importance of the PC dealer channel can be interpreted along these lines.

In the industrial segment, on the other hand, selling to the service providers is the essence of competition. Since there is no direct channel to customers, Boeing and Airbus must sell to the airlines. Indeed, if the disintegrated model holds true, some day it may be more important for IBM to sell to Arthur Andersen than it is to Citibank.

National Control

Pushing the concept of disintegration one step further, there appears to be absolutely no correlation between the nation which dominates hardware production, and those which are the best software and service providers.

Number of Worldwide Systems Manufacturers, by IDC Size Class

	1970	1980	1985	1990	2000
Large-scale	10	15	15	15	12
Medium-scale	20	35	75	75	40
Small-scale	30	100	150	120	120
PC	0	40	300	400	?

Source: IDC, 1991

Few would deny that Boeing is the world's leading airplane manufacturer, but who would want to make the same case for any of the U.S. airlines? The same can be said for Japanese televisions and the relatively dismal state of Japanese TV programming.

This tends to support the view that although Japan might well come to dominate the IT hardware market, this by no means implies control of overall IT marketplace. If Japanese software factories are the way of the future, they will have to prove it on their own merit. The hardware leverage probably won't be there.

Summary and Conclusion

The essence of the disintegrated model can be summarized as follows:

- Base technology suppliers are interested in selling as much of their product as possible. They consequently will sell to virtually anyone. These base technologies will continue to be a crucial industry component, at least as important as new aerospace, video, and telecommunications hardware are to their respective industries.

- Service providers should have no vested interest in any particular hardware or software manufacturing activity. They should be focused on delivering the best current technology to customers, regardless of source. In short, they will buy from virtually any one.

This process of disintegration will have the following ramifications:

- The list of potential leaders in base technologies is relatively easy to put together — IBM, ATT, Intel, Microsoft, Apple, HP, Sun, the Japanese, start-ups, etc. These companies will focus on R&D prowess, price/performance, innovation, low-cost manufacturing, and time to market.

- The traditional computer systems companies will adopt new business models. A few including IBM and HP will adopt to the new base technology model, and perhaps create largely independent service companies. Most, however, will move primarily into the service provision business. To succeed there they will need to shed their bias toward their own products and develop expertise in whatever technologies are in most demand. This has been and will continue to be extremely difficult.

- The key new area for opportunity will be with downstream service providers. The void created by the erosion of the traditional computer systems business is creating huge new opportunities. The current group of leading professional services firms is best positioned for this business, but there is plenty of room for major new successes. By the end of the decade expect some new billion dollar service players to emerge.

A key question is how all this will affect IBM. IBM must prepare itself to be several companies. One must be capable of fighting price wars with Fujitsu as it tries to sell to mainframe hardware to buyers such as EDS and Computer Science Corp. A second IBM must forget that it is a hardware company and use whatever products are necessary to match EDS in the service business. Managing these two new models while transitioning from the old will be as difficult as anything IBM has ever done. But unless it is done, decline is inevitable.

The first half of the 1990s will continue to be one of turbulence as companies reposition themselves to deal with the new challenges of a disintegrating industry. However, a new era of competition is now on the horizon, one that promises higher levels of industry productivity and more predictable behavior for customers and vendors alike. By the early 21st century, if our theories hold true the industry may well have reached a level of maturity more in keeping with its overall size and significance.

The Dis-integration of IBM?

For more than 30 years, the IBM corporation has held a special place among computer companies. Indeed, the IBM mystique has been the envy of the world's multinational firms regardless of industrial sector.

IBM has earned this special status in many ways. However, in the ***Gray Sheet's*** view, one factor has stood out. In the fast changing and technologically complex world of information processing, IBM was the one company that was perceived to fully understand all the pieces. IBM was therefore at least theoretically in a position to develop a coherent hardware, software, and services strategy that would transcend the apparent industry confusion and greatly diminish customers' risk in building corporate information systems.

The essence of IBM's strategy was that it was more important for the company to behave organically than it was for each part of IBM to pursue its own competitive posture.

The December 5th announcements suggest that IBM, at least for now, is in the process of changing its mind. IBM seems to believe that each part of the company must be fully competitive in its own sector, and that the advantages of an overarching strategy such as SAA are not sufficient to overcome shortcomings in individual product areas.

This conclusion is very much in keeping with the "dis-integration" patterns described in this issue of the *Gray Sheet*. The heart of this theory is that competition in our industry is now and will increasingly be taking place at all stages of the value chain — components, systems, distribution, software, services, and user activities.

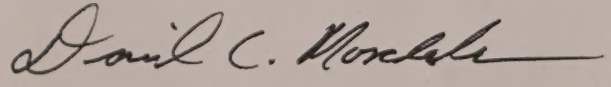
Transitioning from a vertically integrated company to a dis- integrated enterprise will be the most difficult task that IBM has faced since the introduction of the 360 series of computers. Indeed, the steps taken so far are relatively modest and could be seen as merely extensions of things that IBM has already been doing.

The real significance lies in the possibility that IBM has come to the conclusion that its entire business model must change. If so, and if it has the courage of its convictions, more profound changes are inevitable. Examples might include the separation of manufacturing from sales/service for the mainframe and/or AS/400 business units.

The significance to the industry may be equally profound. IBM's position has often translated into de facto industry leadership. As IBM is forced to step back from this role, a vacuum has already emerged. The dis-integrated model is producing lots of successful, highly focussed companies — Intel, Apple, Sun, Microsoft, etc. But which of these can convince customers that it can cut a clear path to the future?

Similarly, many software and services companies have prospered by harvesting fields largely plowed by IBM. If a dis-integrated industry is to effectively meet the challenges of the future, these companies will have to assume much more of a leadership position.

Ever since the PC revolution of the early 1980s, the industry has been giving up predictability and order in exchange for product diversity and lower costs. Customers, of course, want both. Given IBM's diminished role in the industry, developing new mechanisms for order will be the key industry challenge of the 1990s.



David C. Moschella
IDC Sr. Vice President
Worldwide Research

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR DECEMBER 27, 1991 • VOL. 27, NO. 5 Published continuously since 1964.

IBM Now ... and In the Future

Senior members of IBM management met with security analysts in New York on December 7 in one of the most revealing briefings in the company's history. The amount of important new information was sufficient to warrant this special issue. These comments have been excerpted from transcripts of the presentations provided by IBM. Ellipses, (...), have been used to indicate where we have chosen to exclude comments we felt did not add significant understanding to previously presented material. The most salient points of the presentations have been collected on page 12. IBM Chairman and CEO John Akers led with remarks about the forces driving IBM's reorganization, and was followed by Michael Armstrong, Terry Lautenbach, Jack Kuehler, and Frank Metz. Mr. Akers' comments:

All of IBM's current management, myself included, has spent most of its careers managing a single, uniform business: vertically integrated, each organization in the chain adding value and adding differentiation, and governed by a matrix management system.

It's a business model that has served the company well for almost 30 years, and one that we have continually worked to improve over the last five years by strengthening relationships with customers; by creating more competitive products and services within IBM and through a growing network of alliances; and, by driving greater efficiency. (...)

We have made progress. But as much as we have improved, and as much as we anticipate improvement in 1992, we need to do more. (...)

Recently IBM set in motion fundamental changes to further reshape the company. These included changes to our organization, our management system, and our measurement system. (...)

A leaner, more focused IBM will emerge, an IBM made up of a spectrum of different businesses and independent companies. Each will be clear about precisely what business it is in. Each will have maximum independence, fast and focused in the markets it chooses to serve, empowered as a business and in the people who drive its success.

Each company will operate under clear rules of engagement between manufacturing and development and marketing and services, to ensure they mutually deliver against their respective commitments. Finally, each will be part of a commonwealth of businesses that produces growth and prosperity for IBM, for its people, and for our shareholders. (...)

IBM is about to close the books on the most difficult year in the history of the information technology industry. Across the world, the industry is in turmoil. No established manufacturer appears to be immune.

Price cutting is rampant, industry growth rates have declined sharply, profit is vanishing. Manpower redeployment and layoffs are increasing while alliances and partnerships, mergers and acquisitions abound. How much of this is a consequence of the global recession? And how much represents a more permanent change?

Certainly economic conditions are difficult, and they continue to be so, but it's clear the industry is changing in profound ways:

- The rapid pace of hardware technology;
- The shift of revenue from hardware to software and services;
- The increasing attractiveness of small computers relative to large;
- And, overcapacity and fierce competition.

Over the past decade, the number of companies

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IDC INTERNATIONAL DATA CORPORATION
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in the industry has more than doubled — to about 50,000 worldwide. All of these factors are dramatically affecting the industry's performance ... and IBM's.

IBM began 1991 in reasonable shape with good growth coming out of the fourth quarter of 1990. The market valuations of our stock reflected that we had begun what was regarded as a well conceived major product transition. Admittedly, the economic outlook was uncertain, but few anticipated just how serious an impact the war and dislocations would have on global economies. Customers began delaying their purchases; by March IBM's outlook had deteriorated sharply. (...)

As a result, 1991 will show revenue decline, and operational profits will be down. However, IBM is moving into 1992 a tougher, smarter, and more competitive business, resolved to gain market share and improve cash flow and returns.

Markets and Growth

IBM will be shipping new products across the spectrum of our business in hardware and in software. We're moving aggressively into the nonhardware side of the business, and into the original equipment manufacturer's marketplace.

The $70 billion software industry is growing at 10-12%. IBM will also.

Services is a $100 billion industry growing at 10-15%. IBM will grow faster.

IBM's financing business continues to grow more competitive and more profitable. Over the past 10 years, the IBM Credit Corporation has financed more than $47.5 billion in IBM-related transactions.

The OEM market offers $100 billion in business opportunities. IBM intends to grow its OEM business to about $3 billion in 1993. (...)

Expenses and Employment

IBM's operating expense will decline this year, next year and the year after. Research and development investments will essentially be flat this year, over last, and in the next two. Capital investments will decline each year as well. (...)

While IBM is moving into markets that offer improved returns on investment, it is moving out of areas that are less productive. We have sold off nonstrategic businesses; we have remissioned and closed plants. We are continuing to reduce manufacturing capacity — on top of the 25% reduction achieved over the last five years.

We have boosted manufacturing productivity by about 10% a year since 1986; we have cut plant cycle time in half from 40 days to 20; and increased plant inventory turnover by 15%. We have merged many of our marketing and service operations around the world. We are substantially reducing our worldwide employee population, next year by about 20,000. By the end of 1992 we will have cut back by almost 80,000 people from a high of 407,000 people in 1986, a 20% reduction.

We will have 14,000 fewer managers and 94,000 fewer support staff. We will have also moved 44,000 people out of manufacturing and 13,000 people out of maintenance while deploying 2,000 more to development and 10,000 more to marketing. Six years ago, 43% of the IBM population was involved in direct work, 57% were indirect. By year's end the numbers will be reversed. All these actions will reduce cost and expense, and improve our ability to generate revenue. (...)

IBM's commitment to full employment is an important subject. Full employment enhances our flexibility and reinforces pride and morale in our work force.

If further additional significant reductions are required beyond those that are already identified, full employment will clearly be on the table. Employ-

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ment security, over time, will become the responsibility of our new businesses general managers.

Every day more people are working for us, and they are working with us, as we grow our alliance and joint venture business partnerships. Worldwide, we have more than 300 equity alliances and in excess of 20,000 business partnerships. They strengthen our marketing and service firepower by an estimated 150,000 additional people.

The New IBM

What kind of a company is IBM changing into? How will we be doing business differently, and why are we doing it now? Certainly these changes are not ideas that have been hatched over a weekend. We did not come to them lightly. These ideas and fundamental approaches to a different IBM have been around for a long time.

But until IBM felt that future prosperity equal to that which we have enjoyed in the past was not going to be forthcoming from our organization, management was not prepared to make this departure. That conclusion has been reached.

We are segmenting IBM into individual manufacturing and development and marketing and services businesses. That means taking a thoughtful, balanced approach to accomplishing two things in parallel:

- Continuing to manage the matrices of a large, complex, vertically-integrated business

- Enabling individual product businesses and marketing and services companies to better execute and to create new opportunities for expansion and for growth.

IBM will begin to operate on a contract basis with agreed-to business model objectives, between each of our businesses and the IBM corporation.

The company is to have each business measured on a set of financial objectives: revenue, margin, cash and returns. Wherever possible, we will use market disciplines and apply real economics to clarify accountability for investments, for execution, and for the results. (...)

Marketing and Services

IBM's marketing and services companies as we know them today in Italy and Japan, in the U.S. and around the world will, in tomorrow's world, become service companies in the true sense of the word: creating value for customers through their knowledge and their skills, and depending less and less on product cycles and hardware volumes for their prosperity. (...)

To accomplish that, marketing and services companies will have the exclusive franchise for offerings with the IBM logo, with some exceptions. They may offer non-IBM products if that is what is required, and they will pursue partnerships and alliances to enhance their businesses. They will be responsible for managing their own resources—people and other assets, and will be responsible for period profit.

Manufacturing and Development

IBM's plans for manufacturing and development are very clear: wherever possible, and as rapidly as possible, IBM will create self-sufficient and better focused manufacturing and development operations.

These more independent, more focused businesses will make better investment decisions — better because they are decentralized, more agile, faster, and closer to the markets that they choose to serve. They will bring the right new products to market at a faster and faster pace. (...)

We expect our manufacturing and development businesses to generate a better return on assets because each will be able to optimize worldwide, to put their assets to better use, or have fewer of them, probably both.

To accomplish this, they will be free to pursue broader markets, especially the OEM opportunities, and especially additional distribution channels. They will also pursue partnerships and alliances, and will be responsible for managing resources and program profit, and ultimately, for some of them period profit.

IBM will be seizing opportunities more quickly, gaining share in selected markets with returns in the range of 18% return on equity (ROE), and sufficient growth in our cash flow to fuel our growth and pay dividends to our stockholders.

Role of Corporate Management

The corporate management committee will set the financial objectives for the various businesses:

manufacturing and development, the marketing and services businesses, and other ventures such as Prodigy. The committee will review and approve the individual businesses' investment and operating plans and resolve issues when necessary. The committee will be essentially out of operational management activities.

The committee will be responsible for acquisitions, ownership, and divestment decisions, with the financial flexibility to have variable IBM ownership across the range of businesses, from wholly owned, to majority owned, and minority owned, or no ownership at all.

The corporate staffs will provide umbrella legal, financial and personnel support as the businesses require. In partnership with the individual businesses, corporate headquarters will concentrate on IBM's basic beliefs, image and brand identity, and corporate citizenship.

Why the Plan Can Work

IBM feels confident that the 18% target ROE is achievable because the company is much better balanced in its businesses.

The 390 business, over the past decade, irrespective of product cycles, has maintained gross product margins above 60%. Despite the growing alternatives and pressures on price, and mindful of the evolving role of large systems, this performance will continue.

In the midrange, the AS/400 business will continue to gain market share. This business provides appropriate returns. The POWER RISC architecture business is gaining market share while margins continue to improve.

The high end of our PC business is an attractive one, and we think it will continue to be so. The low end of our personal computer business is a different story. We have restructured it. We must improve it—1992 will provide the answer. (...)

We have an excellent storage business and there is a large additional storage opportunity in the OEM marketplace. Networking systems, one of the important elements of systems integration, is a good business in an attractive market, and we expect it to continue so. Systems software is a strong business with good growth, it has the right balance in both margins and returns.

Our maintenance business generates around 10% of IBM's revenues; it is a stable business yielding good returns. Services is a new and important business for us. It is on track, growing rapidly (about 30% per year) with improving margins. Our financing business is an attractive one, consistently above 18 percent ROE in the United States. And we are increasing our leverage outside the U.S. Our U.S. Federal systems business is meeting our objectives and we expect it to continue to do so. (...)

Several product challenges remain: our application software business will show improving profits and returns, and we have more work to do with it. Our printer business has lacked focus and needs to be improved. Finally, our technology business is a large part of the foundation of our hardware product line. Recognizing the heavy investment required, we are forming partnerships and pursuing OEM opportunities to allow us to spread risk to share cost, and improve time to market.

How Does IBM Expect To Do in 1991?

Comments by Frank Metz, IBM Chief Financial Officer:

IBM's 1991 revenue line will be a series of disappointments with few bright spots. The company will miss its revenue plan this year and will miss in all geographies. IBM does expect to continue the pace of increase in services and expects good growth from financing businesses. Software will fall short, but an important, if little noted, statistic is that that portion of IBM's revenue which is less subject to year-to-year fluctuations (software, rental, financing, services, etc.) has grown significantly from 32% in 1985 to 42% in 1991 of total revenue. This speaks well for the future. However, in 1991, revenue is the key, and revenue will be IBM's greatest failure. (...)

Performance at the unit cost line has been adequate in 1991, but gross profits will be hurt by the lack of hardware and software revenue growth, high-end product transition this year, and the competitive environment. The beginnings of the necessary improvement in services margins are apparent. (...)

Expenses have been tightly — and well — managed in 1991. Holding down operating expense at the reduced 1991 and 1992 levels hasn't and won't be easy. But success here gives real hope of having the right base going into the rest of the 1990s.

In terms of assets, performance over the past few years has been spotty. IBM has bent down the curve of asset growth such that operating assets, that is, the nonleasing company assets, are growing at a compound rate slower than revenue. (...)

IBM's capital spending has flattened in 1991, as it has to, but performance in 1991 makes it clear that IBM can't afford the current level of spending and must and will better discipline itself to make the hard decisions regarding capital spending. (...)

The sum of all this will result in a very disappointing year for IBM in terms of earnings. (...)

Nineteen ninety-one will also be an aberration in terms of cash — driven entirely by our earnings shortfall. This required a modest mainline debt increase of $1.5 billion to $2.0 billion and very careful and aggressive management of cash on hand. This is a one-year problem, and with a return to earnings momentum in 1992, IBM will have ample cash to meet ongoing requirements with no debt increase except that necessary for the successful and growing finance businesses. (...)

1992 Outlook

Gross profit in 1992 should stabilize, and, in fact, ought to improve. The resource reductions that have been scheduled and paid for will be difficult to implement. They must be done surgically and they must be done in such a way that we do not affect our ability to generate revenue. Our pressure on unnecessary spending will be unrelenting. (...)

In 1992 we understand that we are accountable to our owners and the other constituencies who watch us for four things: revenue growth, earnings per share, return on equity and cash generation.

IBM needs to more than get its fair share of 1992 industry revenue. The company will not see record earnings in 1992, but will do better than 1991.

Long-Range Financial Goals

IBM's return on equity target is approximately 18%. That's not likely in 1992. Why is 18% ROE important? A return on equity in that range is consistent with the technological, business, and financial investment risks that we take. It is also a level that the owners of the business — our stockholders — know is necessary to sustain and grow earnings and dividends which represent their return. (...)

And finally, that level of ROE is necessary to generate sufficient cash flow to meet our current obligations and fund future opportunities without taking on higher levels of debt in our mainline business. (...)

What makes us think we can achieve an 18% ROE? Consider this financial model of IBM: long-term revenue growth of 6%+, gross profit margins of 51% to 53%, expense to revenue of 35% to 37% for a net before tax of 16% to 18%; an asset turnover of 0.8 or so and leverage (defined as assets supported by equity) of about 2.2 times. (...)

IBM's view of long-term industry growth, worldwide, is 7% to 10%. The rest of the world is growing faster than the U.S.; software and services grow faster than hardware, and PCs and workstations grow faster than larger systems. (...)

IBM's mix of revenue, including participation in markets which are growing rapidly, as well as product lines whose growth is declining, suggests a long-term range of 7% to 8% revenue growth, although IBM is only counting on 6% growth to achieve its objectives. The IBM model's overall gross margins are a couple of points lower than some of you have in mind. They reflect the reality of the fundamental changes taking place in the worldwide marketplace and the weighting of the sources of revenue. (...)

Low End, Midrange Outlook, and IBM's Business Alliance Strategy

Comments by Jack Kuehler, IBM President:

After three consecutive years of double-digit AS/400 revenue growth, this year will weigh in with modest revenue growth, about $4.4 billion measured in processors and operating systems. This drives a much larger number, up to $14 billion, if related business, such as services, applications and financing, are included.

AS/400 market share is growing and continues to enjoy good margins. In 1992, the AS/400 will grow faster than the midrange of the industry. And that will translate into yet more gains in market share. Next year, profits will also improve.

AS/400 performance will be boosted again next year. Today, the line offers a nearly 20x range in performance, from the $12,000 model D2 to the mainframe-class D80. That will be broadened further next year, particularly in the high end with more large-system-caliber machines with multiprocessors. IBM will continue to enhance AS/400 performance, up to 30% each year, on average, regardless of the particular chips under the covers. The AS/400 will draw from IBM's advanced CMOS logic and memory technology as needed — both CISC and RISC. IBM will continue to open up the AS/400 in ways customers want. (...)

RS/6000 Outlook

This year, IBM projected a 50% to 70% revenue growth over 1990 revenue of $1 billion. In fact, the RS/6000 achieved 60% growth and expanded market share.

Next year, revenue will continue to grow aggressively — over 50%. The workstation business is, essentially, a startup company — young, ambitious and growing. And, as the "venture capitalist," IBM is happy to project that this will be a profitable business in 1992.

Nineteen ninety-two will see performance enhancements throughout next year that will keep the RS/6000 ahead of, or in line with, major competitors. We will announce and ship a new low-end model, featuring a single-chip version of our RISC architecture. It will lower entry prices and complement, although not replace, our desktop offerings.

At the same time, IBM has taken steps to put the POWER architecture into the hands of more people in nontraditional ways. Through alliances with Apple and Motorola, IBM will together develop the POWER-PC chips with the aim of creating the industry's most scalable and popular RISC microprocessor family. RISC technology is not confined to the "computer" industry. It may very well find uses in some unexpected areas, such as consumer electronics. (...)

Personal Systems Outlook

The overriding issues on everyone's mind have been the continued commoditization of the PC industry, extreme pricing pressure, and erosion of profit margins. IBM is feeling their effects. This year, revenue will decline about 10 percent from 1990, to just short of $9 billion. (...)

With declining revenue, IBM also lost ground in market share, ceding about two points, primarily to the mass market clonemakers. However, shipments in the second half of the year are outpacing the industry, and IBM is gaining share. The outlook for next year is good. IBM expects the PC industry will grow about 8% to 10% in 1992. IBM expects to grow right along with it, topping $10 billion in revenue, and increasing market share. The profit picture will also improve. (...)

Changing Competition

Not long ago IBM could count its main competitors on one hand — the "BUNCH." Today, IBM counts some 50,000 competitors all over the world, in hundreds of markets, global giants and nimble niche players. The reality of this change means that IBM has all of these design teams competing with it: hardware teams, software teams, distrubution teams. Collectively, they have far more money, capital and talent than IBM could ever muster. (...)

IBM is a formidable competitor in its own right with one huge advantage: it develops and manufactures its own technology. But if it's not careful, that advantage can turn into a huge — and costly — disadvantage. The worst of all worlds is for IBM to have all of that vast development and manufacturing

capability without leadership. Without the edge that that investment should buy. (...)

Put yourselves in the mind set of an IBM technologist. In the 1960s, IBM developed and manufactured products in a serial way. First, the base technology was developed. After it passed some key check points, the system itself was developed. Finally, after that was humming along, the money to develop fabricators and other manufacturing tools was authorized.

This approach served IBM well back then, back when we were virtually the only game in town, and customers waited on us. For example, we started developing technology for the System/38 in 1970. We shipped it in 1979. We started technology development of the thin-film recording head in 1969. We shipped it a decade later. That process was fine for its day. Today, it's a strategy for extinction.

We saw the need to speed things up in the 1970s, and we started overlapping these three processes. We started developing the system before the technology was right, and we started funding manufacturing before either one was finished.

Then in the 1980s, we found we had to severely overlap the processes, developing the system early, betting that the technology would make it. Soon after that, we would make the manufacturing investment. Today, the overlapping is virtually complete. Everything is almost done in parallel and while the follow-on product gets under way.

To illustrate: we are currently shipping one-megabit memory chips and have been for a few years. We are in volume production for four-megabit memory. We are wrapping up the technology for the 16-megabit, and 64-megabit development is in progress. And, we are working on the 256-megabit chip. (...)

IBM Alliances

But maintaining doubly- and triply-overlapping production rapidly becomes unaffordable; unaffordable for IBM, unaffordable for any company vying for technology leadership today. How does IBM deal with these new realities — both of cost and of technology's rapid pace? Alliances.

They make imminent sense for IBM and our partners. We can leverage each other's core competencies. We can share the expense and the risk of these steep investments. And, in some areas, we can expand our product line. Alliances are one way of dealing with the escalating expense in a measurable way that still provides reasonable return on assets. We are also challenged by great strides in technology productivity. (...)

Managing Excess Capacity

Engineers are putting more circuits on a chip; the chip gets larger, so does the wafer from which the chips are cut. As we drive the technology, we are generating increased productivity as a result. In addition, we are migrating more and more function from the circuit board onto the chip. Laptop and notebook users can appreciate the advantage of having the "real estate" inside your computers reduced and swept onto a piece of silicon.

As a result of this integration, we need fewer electronic card and test facilities, fewer raw panel and packaging facilities. At the same time, we have made enormous progress in manufacturing productivity in our plants. We now plan 18 shifts every week, instead of 10. We have much more reliable tools. We're using automation wherever possible, and seeing better yields. Market-driven quality efforts are paying off in tangible ways — in reduced defects, in shorter cycle times.

The net result is that IBM will improve manufacturing productivity from 1980 to the year 2000 by a factor of four, an improvement that goes right on top of those gains in technology productivity.

These two factors have put IBM in a position where, if we do nothing about it, we would have approximately *one-third too much capacity by the year 2000.*

That's a very real problem. How are we going to deal with it? Write-offs come to mind. But they are expensive, disruptive, and the payback is too long. A more productive approach is manufacturing consortia.

An example of a manufacturing consortium is IBM's pact with Siemens on 16-megabit chip production. Together, we will make these leading-edge chips at our plant in Essonnes, France. For the cost of a few more tools, we can double our capacity. Siemens takes half. IBM takes half. We amortize fixed costs against twice the volume, and both of us get the advantage of product cost improvement. (...)

Manufacturing consortia do not have to concern just memory chips. IBM can leverage its core competence as a superb manufacturer to build other companies' disk drives. We can do other companies' electronic card assembly tests or panels. (...)

The point is: IBM can take advantage of its excess capacity in a way that's financially attractive. We would prefer, of course to sufficiently increase demand for our products and technologies so that our plants are humming around the clock. (...)

OEM represents an excellent way to work toward that ideal. We are aggressively expanding our OEM business, in chip sets, disk files, cards and other components and subsystems. For many reasons there are many companies that are not fortunate enough to have a competitive product line of their own any more. IBM still does. They can no longer afford to develop and manufacture hardware. IBM can. They can retune their skills and apply their unique software to our hardware platforms. IBM is more than happy to supply those platforms. (...)

On Apple and Motorola

Alliances are strategic for us in another sense. The only companies making a good living in the PC business these days are those that control the microprocessor — Intel — or the system software — Microsoft. There are good reasons why that's true. Therefore, we thought about dropping an anchor to windward. (...)

We thought: let's take advantage of our RISC architecture, the processor that we invented, manufacture, and that lies at the heart of our RS/6000. Let's take advantage of our AIX operating system. It's not enormously different from other people's Unix, and in time we feel that AIX and others' will merge.

Then, let's seek an alliance where we can, together with our partners, use our RISC chips and AIX software and substantially propagate these platforms. By putting more of them into the hands of customers, we should attract more software vendors to write applications for them. That, in turn, fuels demand for still more platforms. Our aim: to make IBM RISC the platform of choice, the de facto standard, if you will. We chose two wonderful partners in Apple and Motorola. (...)

In addition to this anchor to windward, multimedia represents a major differentiator for us. The use of voice, video, text and music takes advantage of the power of these workstations. Apple is a real leader in software tools for multimedia. We are a hardware technology leader. So we formed a joint venture which you've heard about — Kaleida. The company will be half owned by IBM, half owned by Apple. The Kaleida team will endeavor to set multimedia standards for the industry and make those available to everyone.

Our other joint venture with Apple is Taligent, also equally owned by Apple and IBM. This company aims to deliver a next-generation systems software technology that you've probably heard a lot about: object-oriented software. It can dramatically accelerate application software development so that programs, from word processors and databases to mission-critical applications, can keep pace with advances in hardware. The software lag is very real. Intel 386 PCs have been around since 1986. It's the first 32-bit PC architecture. But we have to wait until 1992 — when OS/2 2.0 ships — to get hold of true 32-bit commercial software applications. (...)

Apple has been working on this object-oriented technology for several years, but they lacked the industrial hardiness needed for enterprise wide business computing. These are the skills that we brought to the table. Our skills come together in Taligent, which will define the next-generation, state-of-the-art operating systems for workstations and personal computers.

Today, we recognize AIX running on RISC platforms. Shortly, you will recognize OS/2 2.0 as the aggregation of Windows, OS/2 1.3 and DOS for commercial applications running on Intel platforms.

When Taligent ships, sometime in 1994, customers will have the ability to use that object-oriented technology concurrently on OS/2 should they choose, concurrently on new releases of AIX should they choose, or they can migrate to a new operating system which will enable multimedia applications to truly exploit the power of workstations and personal computers. And all of this will run on RISC platforms or Intel platforms. We will drive down both tracks, and let the customer choose. (...)

Apple wants to enter the Unix environment, so we and Apple are modifying AIX to put the Macintosh interface on it. When that happens, all of the Mac applications — about 5,000 of them — will be swung over to the RS/6000 product line. Apple, in turn, will drive our RISC chip sets down into notebooks, palmtops, pen-based computers and beyond.

High End Business Segments

Comments by Terry Lautenbach, IBM Senior Vice President:

IBM's mainframe business, which began to turn around in September, continues to improve. Nonetheless, the high end of our business is clearly not a high growth segment of our industry. Growth is single digit — and we have planned accordingly. However, it is still a highly profitable business, and we are changing our business strategy to continue to achieve attractive returns. (...)

Nineteen ninety-one has been a transition year for both large processors and DASD. We are shipping new leading-edge products; we have the largest single systems image in the world and the fastest uniprocessor. Our ES/9000 is more reliable than its predecessor and as good as, or better than, anything in the industry. (...)

Large processors and DASD are being very well received by our customers. Demand is strong — and we think it will continue so. We will see good revenue growth in large processors and large DASD in 1992, and we will gain share in both areas, in the U.S. and worldwide. Overall in the U.S., assuming 2%-3% GNP growth next year, we expect total U.S. business to grow in the mid-single digits. (...)

Enterprise Systems Pricing Issues

Contrary to popular rumor, gross profit margins in ES have not been wiped out by discounting. IBM has a standard volume purchase agreement for processors. We also have a migration offering for qualifying customers purchasing the new systems. Some ES/9000 customers may qualify for both.

Pricing is administered by the trading areas. Over 60 exist in the U.S. alone, and they are large businesses in their own right. The trading area executive has responsibility for many key measurements, but most importantly, they are responsible for market share and profit. Marketing representatives do not have the ability to make pricing decisions.

IBM believes the pricing practices of the trading areas during 1991 have been handled as well as we could have done if we ran it out of headquarters. There are risks associated with this strategy, but it would be far riskier for us to do business our old way and be slow to react to our markets.

Nonetheless, IBM is changing large systems pricing strategy. In the past, IBM hardware prices included many support services because most customers wanted them. Today's market is different: some customers want a lot of service with their hardware, and some want none. (...)

As a result, IBM has set very competitive prices for new technology systems. And we are rapidly moving to a fee services business where if customers want services — contract programming, education, consulting, etc. — they will pay a fair price for them. This means that IBM will be able to maintain strong customer relationships while meeting their needs. With hardware priced competitively, we think we can hold margins while software and services kick in to help improve our return on assets. (...)

Will Large Systems Go Away?

The role of large systems is changing — it is evolving to become the backbone of an enterprise's total information infrastructure. (...)

In this role demand for large systems continues to grow around 25% per year in terms of processing power. It's growing because mainframes simply do some things better than anything else on the market: managing very large databases, processing transactions against those databases, and managing information through worldwide information networks. (...)

Our customers run their businesses through these simultaneous transaction processing applications. These production applications are not going to go away; in fact, they are becoming larger and more sophisticated all the time. (...)

The very trends some believe will kill mainframes — microprocessors and massively parallel systems — will only make them more affordable in the future. (...)

Today we are bringing relatively inexpensive CMOS technology into enterprise systems. Systems memory is CMOS; even our fiber-optic channel technology is two CMOS chips. It used to be bipolar.

We already have S/390 microprocessors which we are using to build the low end of our S/390 line. Our plan is to aggregate S/390 micros into massively parallel systems. This will give our customers explosive price/performance gains. That will unlock tremendous demand for new applications in transaction processing and large database environments. And with S/390 microprocessors our customers current applications will clip right into the new systems protecting their system/390 software investment. (...)

But to really implement our vision we must integrate and manage heterogeneous systems. Our view is that more and more of the value-add of information systems will be in the architectures that allow multivendor systems to work together in the software that will manage systems and handle applications and in the services that will help our customers deploy technology efficiently and effectively. (...)

Our strategy is to serve as the platform architect developing some key software, but also signing up leading vendors to work with us to deliver "best-of-breed" solutions. We have done this with many strategic platforms, including AD/cycle for application development, Systemview for systems management and the information warehouse for data management. And we are making a similar commitment in networking where we are focused on open systems and multivendor connectivity. We are working to provide a rich menu of open systems networking options, while making our own SNA architecture much more open. (...)

To sum up our software business, we are focused on it; it is very profitable. We expect revenue growth to increase next year. (...)

Services Update

The problem in our industry today is not a lack of technology, it is the amount of technology, the speed at which it is introduced, and the challenge of helping our customers use it. That's why our services business is so important. (...)

IBM's services revenue will increase 25% in the U.S. this year. IBM U.S. is increasing its services revenue three times faster than the industry this year with the expectation of even faster growth next year.

The IBM Information Network is a $120 million business in the U.S., growing more than 25% per year. It is close to a $400 million business worldwide.

Our U.S. outsourcing subsidiary — ISSC — has a revenue stream approaching $300 million a year in outsourcing contracts with a contract backlog approaching $3.2 billion. ISSC also has a business recovery services offering. In the U.S. it has more than 1,300 contracts worth nearly $150 million. (...)

Our consulting business advises clients how to become more competitive by rewriting information technology strategies, reengineering processes, and reimplementing new solutions. Through all these services we are giving our customers a menu of solutions to choose from. (...)

IBM World Trade

Comments by Mike Armstrong, IBM Senior Vice President:

IBM operates in 137 countries. In 1990 this represented $42 billion in revenue with a net margin of almost 19%. Nineteen ninety-one results will not be at 1990 levels. Europe will have flat to down revenue with lower profitability, but is experiencing an increase in revenue in the second half. Latin America will have a strong performance, except for Brazil, where the economy, inflation, and devaluation significantly affected our business. Asia Pacific will have a revenue decline, with Japan losing share, although delivering a strong second half, while we will have double-digit growth in Taiwan, Korea, and China. (...)

Our strategy has five fundamentals: (1) expand market coverage, (2) segment resources and delegate authority, (3) reduce our structure, (4) grow our software and services businesses, (5) increase our alliances — and deliver all of this with the best quality in the industry.

Expand market coverage: In Europe we have increased our direct field force by 4,000, or 18%, over the last four years and our indirect or business partner IBM representation by 18,000. In Japan our direct is up 3,500, or 27%, and our indirect up 9,000. This deployment is true of all of our world trade country operations and is based on the premise that presence and skill will deliver relationships and orders. (...)

Segment resources: We began segmentation several years ago. We have established specialized units,

independent of our large account organization, that are dedicated to marketing to small business. IBM Canada implemented such a specialized unit in 1988, and this unit has had a compounded growth rate of over 10% and has gained 12 points of market share. IBM France has transformed its branch office marketing organization into industry specialized business units that have the authority to work on customer solutions and IBM profit, instead of just making quota and selling out of the sales manual. The branch manager can now contract to provide non-IBM-based content; he can integrate in offering the best solution; he can price to be competitive — all without checking with superiors. He will be measured on market share and IBM profitability.

By segmenting and delegating we believe we can not only respond with timely solutions, but we can add the necessary and attractive value which will satisfy our customers and protect gross margins. This is an important change in how we do business, and maybe just as important, it is not theory. It is in practice today in many areas of our business. It is exactly what we did to help our maintenance business in Europe face increasing price and margin pressures. (...)

Structure reductions: IBM can execute our marketing coverage strategy with much less staff and support and not lose the necessary firepower to deliver revenue growth. This year World Trade operating expenses will be around 28%-29%. Next year they should be less than 27%, and we're going to get to an operating expense of 23% by 1994. (...)

Software and services growth: Software today is a $6.3 billion business in World Trade, and with the steps we have taken to expand our coverage and increase specialization, we expect to achieve 12% growth in 1992. A growing piece of our software business has been our country-developed application software. In Europe, country-developed application software will be a $190 million business this year. (...)

Maintenance business is our leading services operation, with strong margins and modest revenue growth due to improving quality. Nonmaintenance services revenue was $2.1 billion in 1990, and it has a 41% CAGR from 1987 through 1990. We intend to grow our services revenue 30% in '92, and by yearend '93, services and software will be 38% of our business in World Trade. In IBM Germany next year, more than half of our profit will be from nonhardware sources. (...)

Alliances: Alliances are fundamental to delivering solutions to our customers and growing our revenue. Some examples: Our strong agent program in Europe has helped to make us market leaders in midrange computers. Investment in Westbridge has made us the largest facilities management provider in Canada. A joint venture with MC&A and Ivex in Brazil establishes immediately strong PC and minicomputer businesses there. An OEM relationship with Mitsubishi in Japan opens a new opportunity to grow our S/390 business.

1992 Outlook by Geography

We foresee a continuing difficult economic environment in the U.K., with France showing modest economic growth, Germany slowing, Italy flat to improving, Spain picking up with the Olympics, and the Nordic countries still struggling to recover. We have worked hard to be accepted as a European company. Combined with an expected modest improvement in the European economy in '92, this should enable IBM Europe to grow faster than the industry, at around 5%-6%. Eastern Europe will continue to grow economically, and we see IBM growth in the range of 20%. (...)

In the former USSR our outlook is dependent on seven or eight projects that total over one billion dollars in defined potential. But the issues of political stability and hard currency are fundamental to our progress.

In Latin America, IBM works off a long, stable, and respected presence. We will experience strong growth in Mexico and Venezuela, as well as in the Andes countries. The tough question is, will Brazil stabilize and recover? If so, we see a terrific year. If not, a good year in Latin America.

In IBM Asia Pacific, IBM Japan gives us development, manufacturing, and skill leverage in the region. We expect 7%-8% growth in our business in Japan, although the Japanese economy is softening. IBM is, however, expanding the PC and minicomputer businesses and strengthening its coverage in the distribution and public sector industries. In Australia, a slow economic recovery will mean a continuing difficult environment while the South Asia countries will remain strong with 16% growth.

In summary, World Trade revenue in 1992 will grow 5 to 8%, hold or gain share in every geography, and improve our profitability over 1991.

Gray Sheet Highlights of IBM Remarks

John Akers on IBM in 1991 and 1992:

IBM in 1991 will show revenue and profit declines. (...) In 1992, [we will be] moving aggressively into the nonhardware sides of the business. (...) The $70 billion software industry is growing at 10%-12%. IBM will also. (...) Services is a $100 billion industry growing at 10%-15%. IBM will grow faster.

On manufacturing and full employment:

We have boosted manufacturing productivity by about 10% a year since 1986; we have cut plant cycle time in half from 40 days to 20; and increased plant inventory turnover by 15%. We have merged many of our marketing and service operations around the world. We are substantially reducing our worldwide employee population, next year by about 20,000. By the end of 1992 we will have cut back by almost 80,000 people from a high of 407,000 people in 1986, a 20% reduction. (...)

Frank Metz on financial targets:

What makes us think we ean achieve an 18% ROE? Consider this model of IBM: long-term revenue growth of 6%+ (we expect 7%-8%, but only need 6% to meet our financial objectives), gross profit margins of 51% to 53%, expense to revenue of 35% to 37% for a net before tax of 16% to 18%; an asset turnover of 0.8 or so and leverage (assets supported by equity) of about 2.2 times. (...)

Mike Armstrong on 1991 World Trade results:

IBM operates in 137 countries. In 1990 this represented $42 billion in revenue with a net margin of almost 19%. Nineteen ninety-one results will not be at 1990 levels. Europe will have flat to down revenue with lower profitability, but is experiencing an increase in revenue in the second half. Latin America will have a strong performance, except for Brazil, where the economy, inflation, and devaluation significantly affected our business. Asia Pacific will have a revenue decline, with Japan losing share, although delivering a strong second half, while we will have double-digit growth in Taiwan, Korea, and China. (...)

Jack Kuehler on AS/400:

After three consecutive years of double-digit AS/400 revenue growth, this year we'll see modest revenue growth, about $4.4 billion (processors and operating systems). This drives a much larger number, up to $14 billion, if related business, such as services, applications and financing, are included. AS/400 market share is growing and continues to enjoy good margins. In 1992, the AS/400 will grow faster than the midrange of the industry. And that will translate into yet more gains in market share. Next year, profits will also improve. (...)

On RS/6000:

This year, IBM projected a 50% to 70% revenue growth over 1990 revenue of $1 billion. In fact, the RS/6000 achieved 60% growth and expanded market share. Next year, revenue will continue to grow aggressively — over 50%. (...)

On Personal Systems:

[IBM is] feeling the effects of continued commoditization of the PC industry, extreme pricing pressure, and erosion of profit margins. This year, revenue will decline about 10 percent from 1990, to just short of $9 billion. (...) With declining revenue, IBM also lost ground in market share, ceding about two points. However, ... IBM is gaining share. The outlook for next year is good. IBM expects the PC industry will grow about 8% to 10% in 1992. IBM expects to grow right along with it, topping $10 billion in revenue, and increasing market share. The profit picture will also improve.

On changing competition:

Not long ago IBM could count its main competitors on one hand — the "BUNCH." Today, IBM counts some 50,000 competitors all over the world. (...) The reality of this change means that IBM has all of these design teams competing with it: hardware teams, software teams, distrubution teams. Collectively, they have far more money, capital and talent than IBM could ever muster. (...) How does IBM deal with these new realities? Alliances.

Terry Lautenbach on mainframe discounting:

Contrary to popular rumor, gross profit margins in ES have not been wiped out by discounting. IBM has a standard volume purchase agreement for processors. We also have a migration offering for qualifying customers purchasing the new systems. Some ES/9000 customers may qualify for both. (...) IBM believes the pricing practices of the trading areas during 1991 have been handled as well as we could have done if we ran it out of headquarters. There are risks associated with this strategy, but it would be far riskier for us to do business our old way and be slow to react to our markets. (...)

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR JANUARY 10, 1992 • VOL. 27, NO. 6 Published continuously since 1964.

United States 1991 IT Market Tops $116 Billion: Software and Services Growth Offsets Sluggish Hardware Revenue

Despite the chilling effect of the first recession in a decade, the United States information technology (IT) market topped $116 billion in 1991, representing growth of 4.2% from 1990's $111 billion. Systems revenue, fueled by a slight decrease in PC business and a 9.9% drop in mainframe spending, declined by 3.0% from 1990 levels. As in years past, strong services and software revenue growth saved what might have been a disastrous year for the U.S. computer industry.

These days — amid stories about the trillion-dollar U.S. national debt — $116 billion may seem relatively unimpressive. But comparisons can be deceiving. Unlike national debts, $116 billion for IT suppliers is invested as an increasingly central element of the entire national economy. It helps support one megacorporation, IBM, and forms the bedrock beneath such major U.S. companies as Digital Equipment Corp., Hewlett-Packard, Tandem, Apple Computer, Sun, Compaq, Intel, Microsoft, Computer Associates, and Lotus Development.

Moreover, although the U.S. has lost share to much of the rest of the world, it remains roughly equal in size to the whole of Europe, accounting for 35.3% of the $328 billion expended on IT in 1991. This compares to 28.0% of the world's gross domestic product in 1988, as reported by the World Bank. Some key points:

- The U.S. IT market grew 4.2% in 1991 over 1990, saved by strong software and services revenue growth.
- PC unit shipment revenue dropped by 0.4% in 1991. Yet, what's worse, no hardware segment grew any faster than PCs.
- Mainframe spending shrank by 9.9% in 1991. The midrange (IDC's small- and medium-scale systems aggregated) dropped by 3.4%.
- Overall hardware spending declined 0.9% in 1991.
- The packaged software industry in the United States grew 11.5% to total $19.9 billion in 1991, sustaining a second year of strong growth.
- Overall, services markets in the U.S. grew over 10.7% in 1991, led by a 13.8% growth in professional services, while support services sustained 7.5% growth.
- From 1991 onward, the majority of the U.S. IT market will belong to software and services, not hardware. Spending on software and services accounted for 50.7% of the entire U.S. IT market in 1991.
- In 1970, multiuser systems comprised 78.5% of total U.S. IT spending; by 1990, the proportion had dropped to 22.6%.

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- As recently as 1980, virtually the entire U.S. computer market was proprietary; in 1991, more than three-fifths was "open."

- As of 1990, the U.S. represented 36.2% of the worldwide IT market. It accounted for 34.9% of worldwide computer systems, 49.9% of data communications, 41.3% of packaged software, 41.3% of support services and 29.8% of professional services in 1990.

A basic segmentation in the U.S. computer industry — between technology suppliers and solutions providers — became apparent in 1991 (see the *Gray Sheet*, December 6, 1991). IDC is labeling this phenomenon "dis-integration." The coming year promises a further divergence of these two basic types of computer technology markets. This may, in turn, further imperil suppliers in the middle caught without long-range plans for reaching either side.

Preliminary 1991 Returns

Just how bad has it been in the United States for hardware suppliers in 1991? Bad: PC shipment revenue declined 0.4%; for the first time since 1986, mainframes will experience negative growth, -9.9%, in 1991. Overall, systems spending decreased 3.0%.

For all IT suppliers, it could have been worse. Strong double-digit growth in the nonsystems IT market drove overall growth to 4.2%. Markets in the U.S. for software, data communications equipment and services continued to outperform the hardware side of the business.

It should be noted that results for 1991 should be viewed as preliminary estimates. IDC has begun a process of finalizing its market estimates for the year. The preliminary sizing of several market segements has already been completed; the remainder will be completed over the next couple of months. Some of the data are therefore more "preliminary" than others, based on the best current views of senior analysts in the relevant programs.

Present estimates place 1991 growth in the U.S. systems market significantly below the previous five years. We note the following highlights of 1991 U.S. systems markets:

- The U.S. PC/workstation market has followed two years of slack growth (which in PC terms means anything below double-digit expansion) with a slightly negative year in 1991. Could it be maturity has beset the PC industry? Not a bad guess. Although i486-based PCs showed strong growth and 80386-SX machines have taken up much of the slack from their 80286 predecessors, very weak unit growth meant that overall revenues dropped. The winners in 1991 are the second- and third-tier vendors (like AST, Gateway 2000, CompuAdd, and Packard-Bell) that wrested sales from bigger, more established suppliers like Compaq and IBM.

- The freeze in mainframe business during the wait for IBM's September 1990 Summit announcement never thawed in 1991. Annual unit shipments decreased in 1991. Mainframe revenue plummeted by 10% from 1990 levels. The cumulative number of large-scale systems in use continues to decline: more systems were retired than were added to the base. Vicious price cutting kept shipment values down. While users in the U.S. are buying fewer, but larger, mainframes, values did not climb proportionately to system size. An increase in the size of average U.S. mainframe shipment was primarily — indeed solely — responsible for forestalling a freefall in 1991 mainframe revenues.

- The midrange is another fiercely competitive segment of the U.S. computer industry. Medium-scale shipment revenue dropped 5.9%; small-scale was off 1.2%. While some manufacturers of multiuser systems experienced strong growth (e.g., Hewlett-Packard and IBM)

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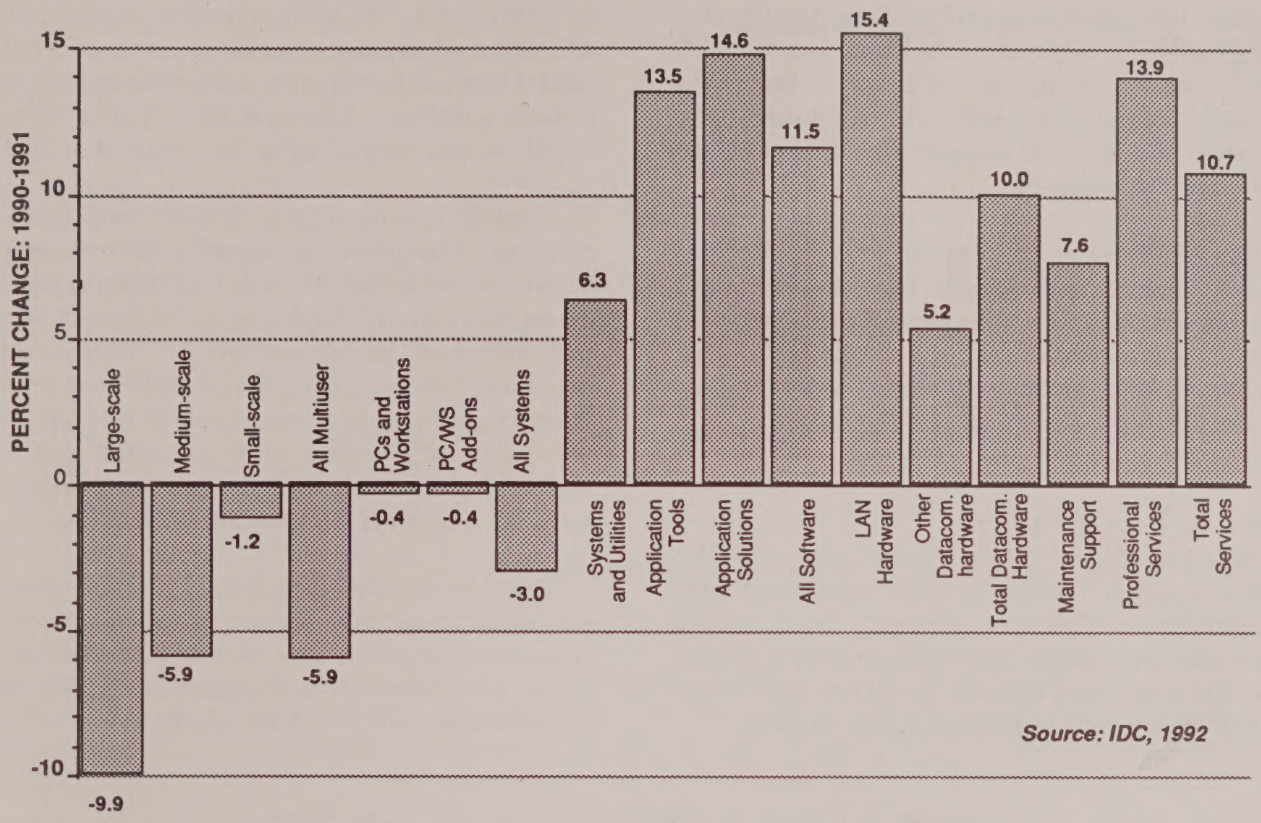
U.S. IT Growth by Market Segment, 1990-1991



few of the established hardware vendors escaped unbloodied from the intense 1991 competition. NCR lost market share (perhaps distracted by AT&T), Wang and Unisys continued downward spirals.

- Unix systems revenue was one of very few bright spots in the U.S. in 1991, growing by 15%.

- Some major PC companies took exceptional beatings in 1991. IBM continued to drop market share, despite some aggressive product announcements and distribution moves. Compaq, never one to founder, foundered (not quite miserably). Apple bought two or three points of unit market share with a very aggressive pricing strategy, but revenues were up only slightly. To gauge how quickly PC markets are changing, recall the dizzying array of "strategic" partnerships and joint development consortia that were announced in 1991: Apple and IBM, IBM and Novell, Novell and Digital Research, ACE (Microsoft) and everyone (except IBM and Apple), Intel and IBM.

- Strong portable and notebook PC sales could only offset the overall decline in desktop PC sales. Portable prices dropped far too rapidly to compensate for the sluggish overall PC sales.

On the bright side, 1991 U.S. IT growth is positive because of the continued very strong expansion of markets for software as well as professional and support services (and to a lesser degree data communications).

Sales of all packaged software (the revenue of independent software vendors and the software license revenue of systems manufacturers with whom the ISVs compete) maintained a strong 11.5% growth rate, the second straight year of strong growth. Sales of application tools increased 13.5%, while application solutions increased 14.6%. Systems and utilities growth was slower, 6.3%.

While the returns for professional services show some slackening of growth, from 15.9% in 1990 to 13.9% in 1991, this can hardly be viewed as discouraging news. Professional services are nearly a $20 billion industry in the United States. Some of the industry's strongest competitors will continue to drive growth in this, perhaps the most vital segment of the U.S. computer industry.

Growth in sales of support services dropped slightly. Despite continuing strength in the PC and data communications support arenas, hardware maintenance for multiuser systems was again weak, but still higher than any segment of hardware market, and higher than overall U.S. IT growth.

What to Expect in 1992

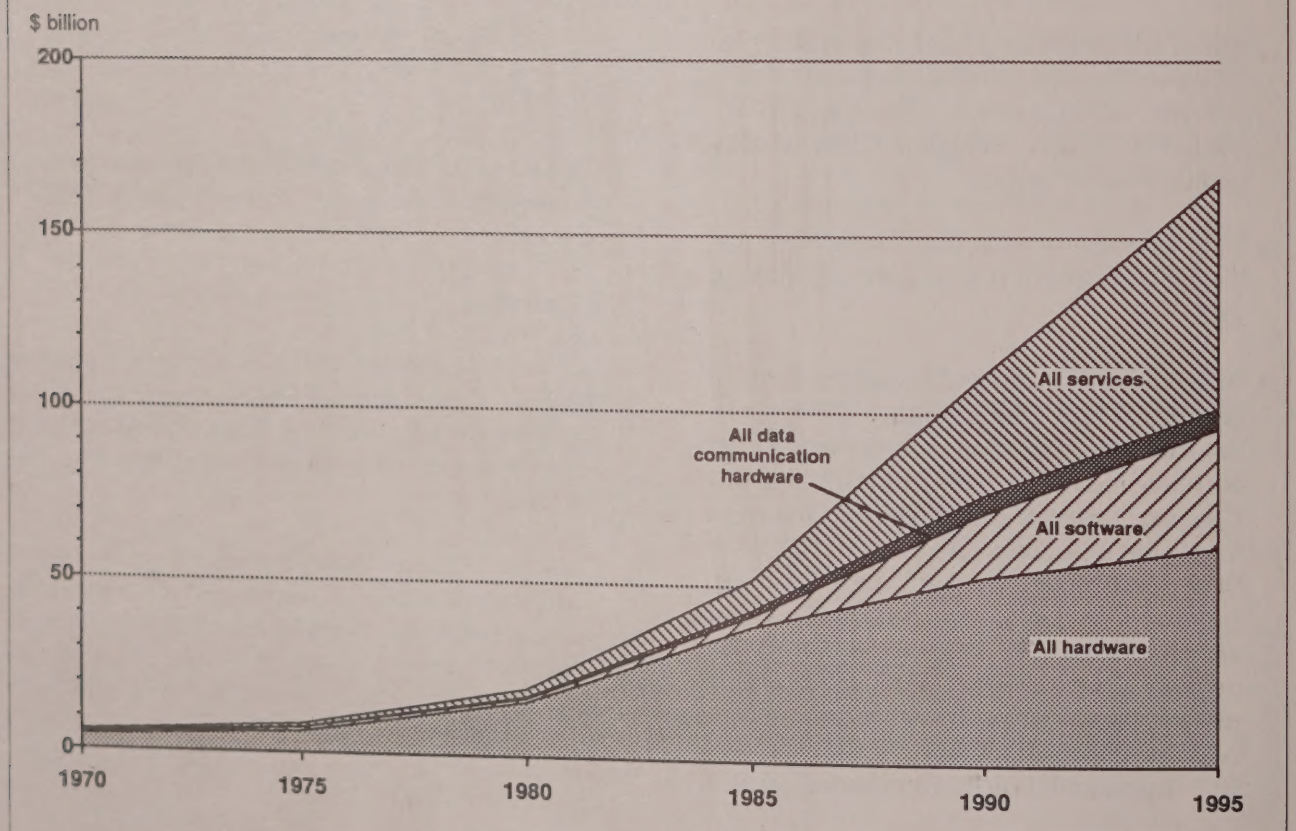
Watchwords for 1992 are "cautious optimism" for at least a partial recovery in major systems markets. Overall industry growth will again be driven by growth in nonsystems spending: software, connectivity hardware and services. In each major IT market, we look for the following activity in 1992:

The U.S. PC market will experience significant realignment and moderate recovery to 3-4% growth in 1992. During 1992, as the industry grapples with a half-dozen alternative schemes to ten years of IBM/Intel/Microsoft dominance, a return to double-digit growth is unlikely. Likewise, the full effect of pen-based computers will not yet be apparent in 1992.

Growth in markets for the largest computers will continue to languish. Two years of decreasing unit shipments may be reversed in 1992. Mainframe revenues, however, will likely show 2-3% growth. Fewer mainframes will be in use at the end of 1992 than at the beginning. The decreasing importance of mainframe product cycles plays a central role in our forecasts. We anticipate no major Summit-related uptick in mainframe sales. The trend toward fewer, but larger, large-scale systems installations will continue.

A flat, to slightly down, 1992 U.S. midrange market will be no surprise. Among the key questions for suppliers competing in a zero-sum, market-share game: how long can multiprocessing CISC-based systems keep pace with RISC advances?

U.S. IT Revenue by Market Segment, 1970-1995



Source: IDC, 1992

THE GRAY SHEET
Computer Industry
REPORT

1991 U.S. Review and Forecast

DID YOU KNOW ...

- that in 1991 revenue from U.S. PC sales actually decreased ...
- that for the first time ever, more money in the U.S. was spent on software and services than on all systems hardware combined ...
- that while the midrange was losing market share as a whole, Unix systems revenue soared 15% ... ?

.... if not, you should consider IDC's 1991 U.S. Review and Forecast!!

Each year 34 IDC research programs report on the state of the U.S. information technology (IT) market in 34 specific market segments, whether mainframes or PC software, Unix workstations or systems integration contracts. IDC has assembled that information in a single, comprehensive report, the *1991 U.S. Review and Forecast.*

This report presents a composite state of the U.S. market for information technology. A full bibliography would include virtually all of IDC's 1991 research, as well as the thousands of reports IDC has published over the past 27 years.

The base year for the report is 1990. The report includes early estimates on market sizes in 1991, alongside projections to 1995. In addition, the 50-page report presents 20 years of historical data, and complete analysis of each market segment, to put the 1991 results in the proper context.

The 1991 U.S. Review and Forecast is part of a series of reports detailing consistent data on worldwide computer markets. It's two sister reports are: *Western European Information Technology Spending Patterns, 1989-1995* (IDC #A-191, August 1991), *Asia/Pacific Information Technology Spending Patterns, 1990-1995* (forthcoming).

The *1991 U.S. Review and Forecast* is available to Gray Sheet readers for only $595. Call 1-800-343-4935, extension 4389 to order your copy today!

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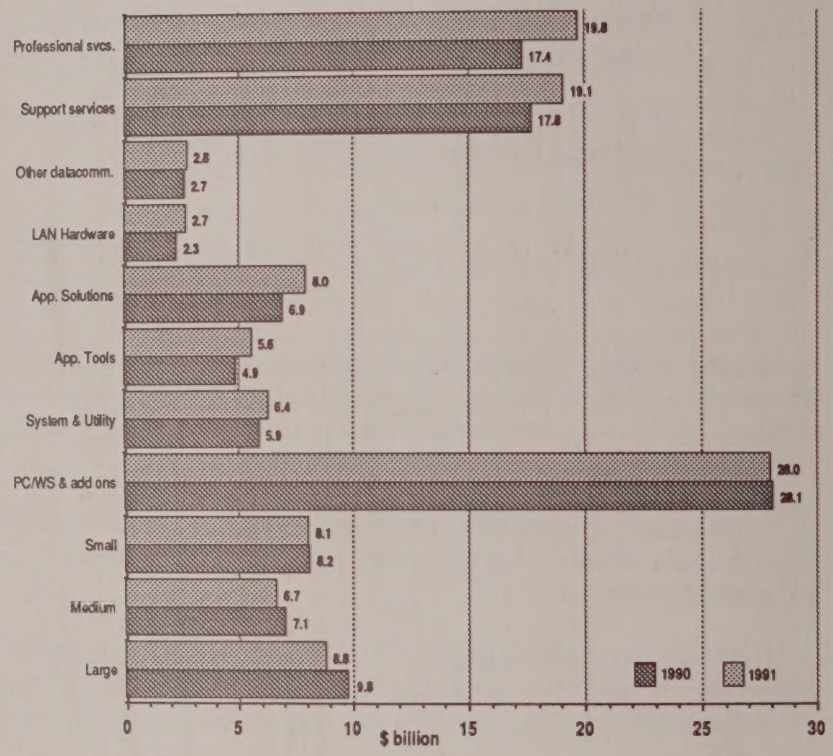

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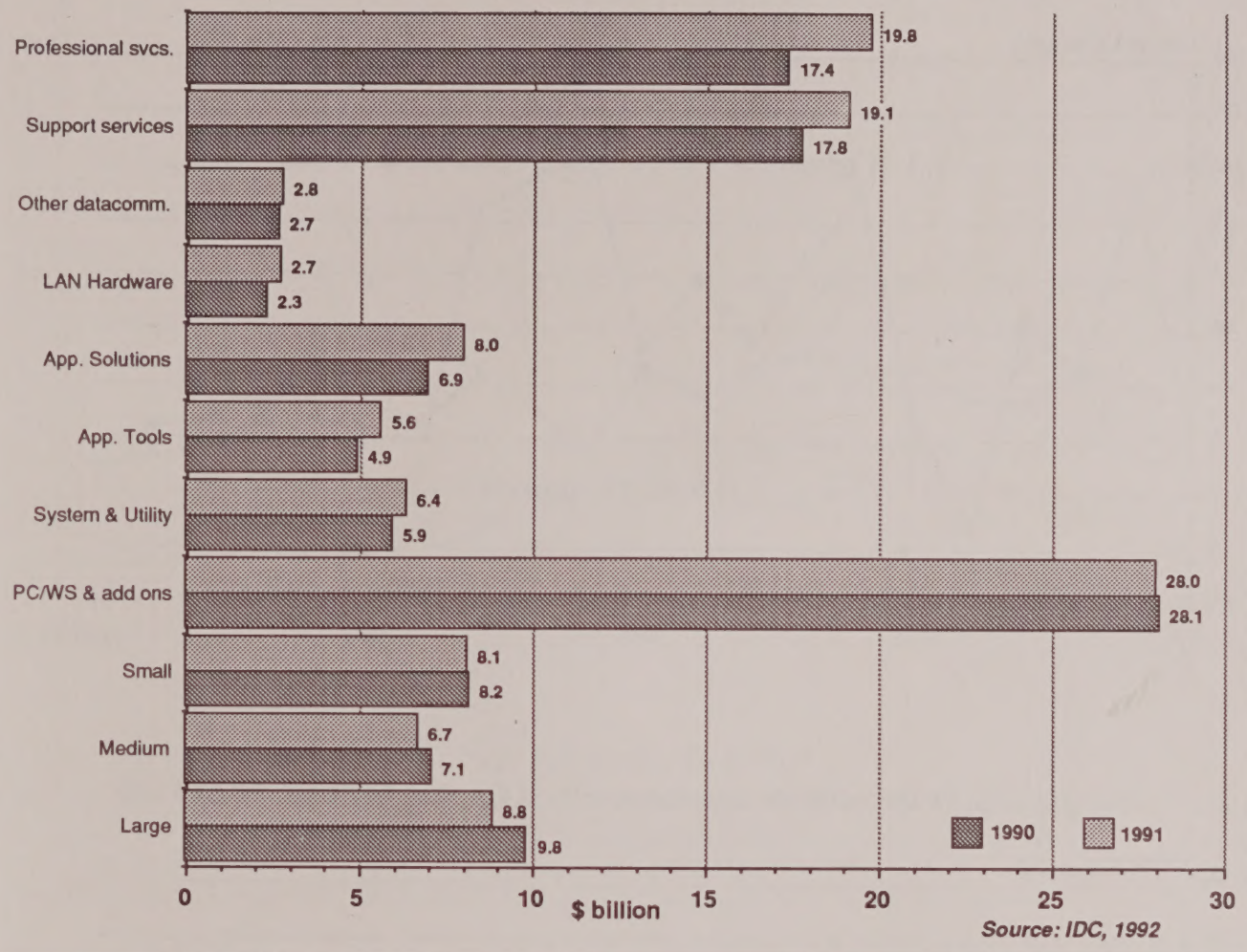
U.S. IT Revenue by Market Segment, 1990 and 1991

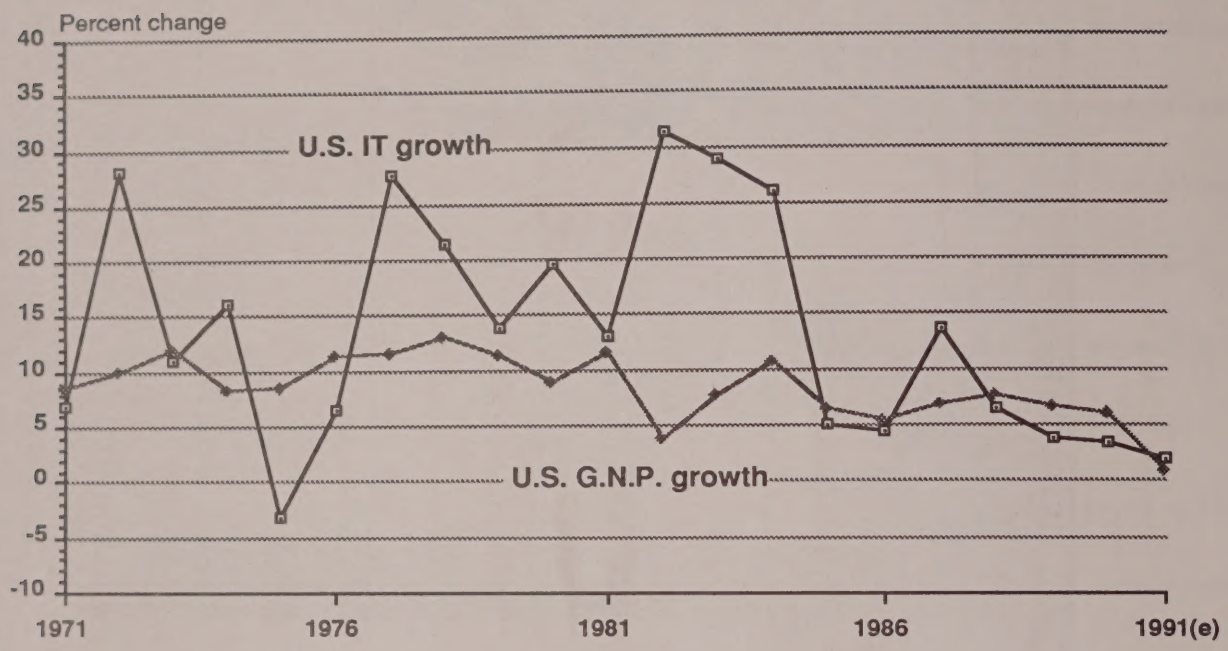


Overall, the fastest growth in 1992 will again come from nonhardware market segments of the U.S. computer industry.

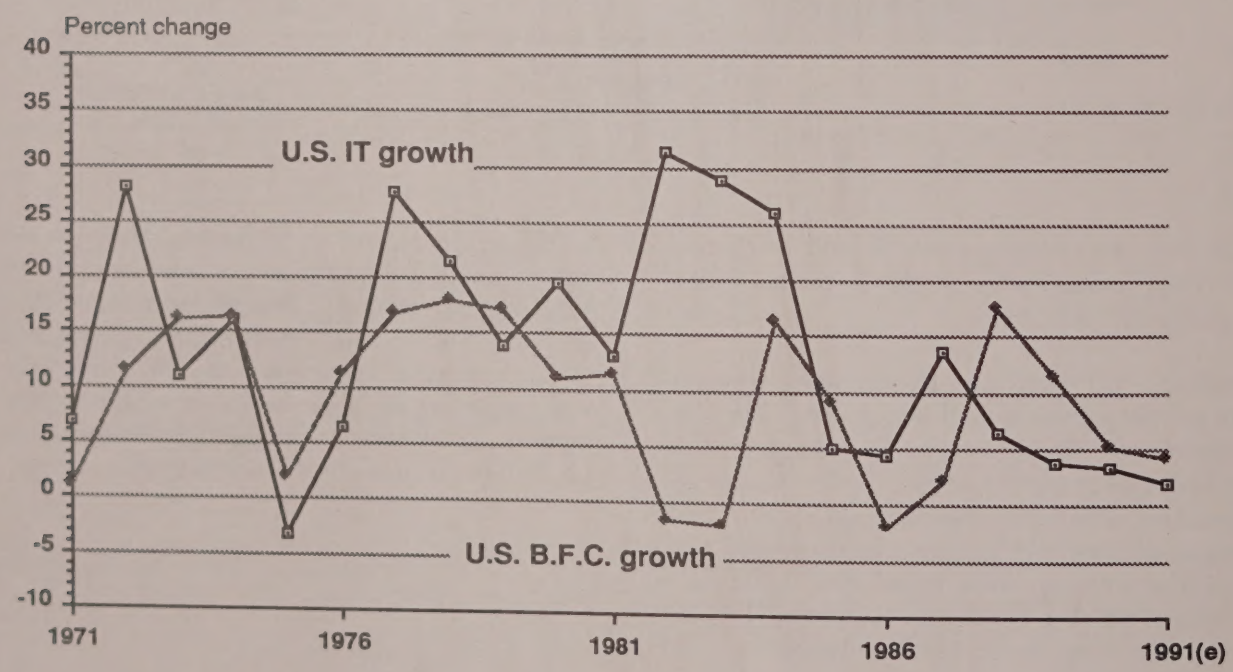
Software will likely outperform other segments again in 1992 for the second straight year. The U.S. packaged software industry will continue to shift from dominance by the utilities and system-level software to parity between application development tools and application solutions. The reason: utilities and system software are more affected by the sluggishness of net new multiuser system installations, more so than solutions and tools software.

Growth in demand for professional services will again remain well above overall industry growth. While defense-related professional services and system integration contracts will begin to decrease in 1992, commercial contracts will rise. Professional services suppliers are aggressively moving into commercial markets and will compete for a broader range of commercial contracts than ever before.

U.S. IT Growth vs. U.S. Gross National Product Growth, 1970-1990



Annual U.S. IT Growth vs. Business Fixed Capital Growth, 1970-1990



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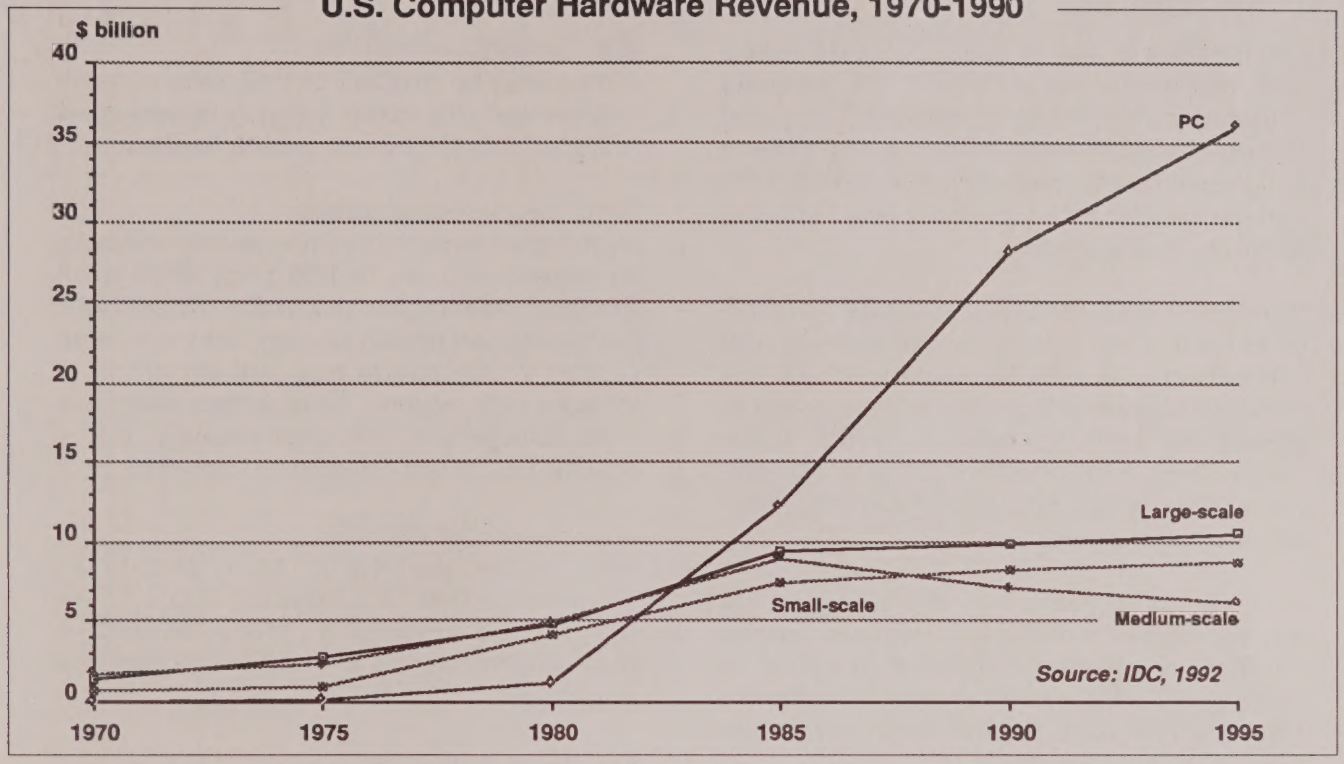
U.S. Computer Hardware Revenue, 1970-1990



IT vs. Economic Growth

The U.S. IT industry grew at a compound annual rate from 1970 to 1990 of 16.7%. This compares to an average GNP growth of 9% for the same period (above left); the rate for durable manufactured goods was 8%, and for services 10%. (All historical data are in current dollars, unadjusted for inflation.) Even while business fixed capital growth languished during the early 1980s, U.S. IT growth remained very strong (left, below).

During the early 1980s, the nation was, like today, experiencing a recession. Apart from 1980 and 1981, the U.S. IT industry was generally strong, benefitting from healthy growth in every segment from 1980 to 1985 including rapid expansion in the new PC and LAN markets. However, this is only one reason why the apparent insulation of U.S. IT spending from the Reagan recession should not raise hopes for a similar escape in 1992. Also, bear in mind:

- The softness that settled on the U.S. multiuser systems market in 1985 — i.e., the height of the Reagan recovery — never really went away, which has left little maneuvering room for many vendors during a general economic downturn.

- The transition to desktop computers and other open systems has already cut average profit margins. Price wars, unleashed to lure balky customers anxious about the recession, have produced bloody results.

- Because of the PC revolution, for the first time ever during a recession significant portions of the hardware and software industries are subject to the vagaries of individual consumer confidence, rather than simply corporate investment decisions.

The critical issue facing U.S. IT suppliers during the current recession can be summarized briefly: Over the past half decade, the balance of power broadly shifted from vendors to users; the current recession has accelerated the shift at the expense of suppliers' revenue and profit targets.

1992 Outlook

On the heels of a so-so 1990, IDC's preliminary retrospective analysis of the 1991 U.S. computer market reveals continued mediocrity. Compared to the industry's historic ability to grow, 1991 was a disappointment, reinforcing the view that the industry has entered a significant period of maturation and realignment.

What about 1992? First, the good news. The prospects for revenue growth derived from services and software are as bullish as prospects for any industrial segment of the economy in the recession-pocked near-term U.S. outlook. Growth in services-related revenue in 1992 will be led by professional services, as opposed to maintenance and other support services.

And the not-so-good: only the youngest and smallest segments of the U.S. hardware market are likely to experience double-digit growth at any time over the next five years. We offer the following comments for the coming year from some of IDC's top analysts:

Vicki J. Brown, workstations:
Based on a recent survey of 200 sites with more than 10 workstations, user budgets for workstations in the U.S. in 1992 will be tightening, and may very well decline. As a result, 1992 will be a tough year for workstation suppliers.

George Newman, professional services:
The key strategic challenge for larger suppliers of professional services in the U.S. will be to broaden the scope of services they offer, such as providing up-front consulting and business process reengineering services. While overall market growth will total a healthy 10-15%, some segments will grow even faster.

Steve Josselyn, large systems:
After a sluggish first half of 1992, sales of large-scale systems will rebound slightly in the second half to drive 2-3% revenue growth for the year.

David Card, midrange systems:
Midrange systems, led by Unix systems, will make a moderate recovery in 1992 from 1991's small shrinkage. AS/400 growth will slow dramatically, but growth will remain positive. New very competitive VAX products may stall movement to Digital's Unix systems. Unix system revenue is expected to grow 15-19%, while overall midrange revenue will be up only slightly from 1991.

Bruce Stephen, PC hardware:
Revenue from the sales of PCs in 1992 will be greater than 1991. But lingering effects of the sluggish economy, and a fiercely competitive, price-sensitive market, will hold overall growth to single digits.

Rick Villars, networking:
Demand for all types of networking products will focus on consolidating isolated LANs and older installed systems into a manageable and expandable enterprisewide solution. Shipments of LAN cards will increase by 16% in 1992, but revenue will only grow by 3%. LAN concentrators (over 25%) and multiprotocol routes (over 28%) will see the strongest growth.

Tony Picardi, software:
Led by continued strong growth of Windows applications, overall software revenue will grow 12-13% in 1992. Application solutions growth will be closely followed by growth in application tools, primarily CASE and object-oriented tools.

United States 1991 Review and Forecast

The information in this issue of the *Gray Sheet* has been culled from IDC's annual analysis of the U.S. IT market: the 1991 U.S. Review and Forecast.

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Computer Industry REPORT

DOUG McLEOD, EDITOR JANUARY 27, 1992 • VOL. 27, NO. 7 Published continuously since 1964.

Japan's 1991 IT Growth Rate Is Lower than 1990, but Compared to the U.S. and Europe ...

The Japanese market for information technology (IT) accounted for over 18% of the worldwide market in 1991. It is almost invariably the second largest country market in the world (behind the U.S.) in every software and hardware market segment that International Data Corporation (IDC, publisher of the *Gray Sheet*) tracks. Where it trails — in application tools and application solutions software, and LAN hardware — Japan is expected to claim the number two slot by 1995.

According to preliminary estimates by IDC analysts, the Japanese market grew by 10.5% from 1990 to 1991 while the worldwide market grew by only 5.6% (both measured in constant 1990 dollars). In contrast, the United States IT market grew by only 3.4%.

Japan's catch-up against the U.S. (in terms of absolute size) would be even more dramatic but for three factors: the U.S.'s overwhelming lead in PCs and workstations, the United States' more dynamic software industry, and the sheer size of its installed base (which feeds other market categories either directly or indirectly).

Size is not necessarily correlated to opportunity for non-Japanese IT suppliers, however. The presence of a strong domestic IT manufacturing base, the Japanese government's willingness to favor domestic suppliers, and unique cultural traits that make establishing Japanese operations a long-term commitment all combine to make the Japanese market particularly hard to crack for nondomestic suppliers.

How unique is the Japanese IT market? We note the following characteristics:

- Personal computer sales are proportionately much lower in Japan (about 37% of total hardware sales) than in the U.S. (53%).
- Portable personal computers are proportionately much more popular than in the U.S. and Europe.
- The Japanese midrange comprises over 36% of total hardware spending. In the U.S. it comprises barely one quarter.
- Japanese mainframe spending is proportionately higher (26% of all hardware) than that of the United States (18%).
- Japanese software is, more likely than not, customized. Packaged application solutions represent a lower proportion of total IT spending than in other countries.
- Professional services, the IDC category under which customized programming services are counted, are a much larger proportion of the overall market than elsewhere.

While generally more rosy than elsewhere, the short-term outlook in Japan is mixed. The long-lasting boom in Japan's economy is slowing as the rest of the world slides into deeper recession. Pessimism in the computer industry is running higher than ever. Nonetheless, as Japan further explores its lead in worldwide manufacturing of automobiles, consumer electronics equipment and semiconduc-

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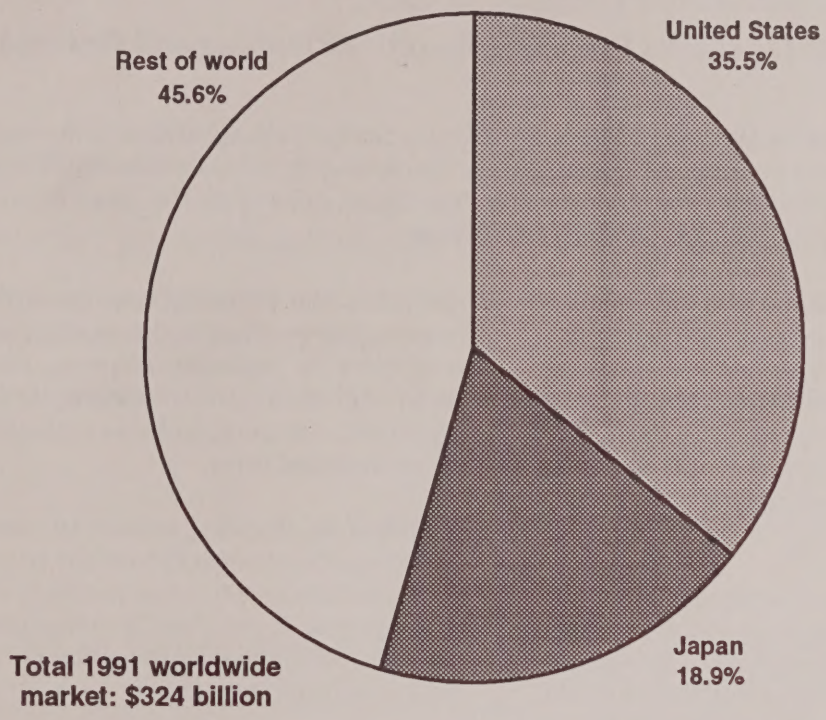
1991 Worldwide IT Market by Major Region



Source: IDC, 1992

tors, among other products, it will continue to consume IT equipment and software voraciously.

IDC expects that between 1991 and 1995 Japan's consumption of IT will increase by a compound rate of approximately 13%. The corresponding worldwide growth rate will remain below 10%.

Where are the biggest Japanese opportunities? Sales of PCs and PC-related products will grow faster than other system segments, approximately 15%. LAN hardware will grow almost 33% annually.

Despite a bias toward centrally controlled IT systems, multiuser system sales will not keep up with PCs. Multiuser systems will outperform worldwide multiuser growth, but only barely.

The largest growth areas in the Japanese IT market are for software and services. Packaged software will gradually outgrow custom software. As a result, professional services growth will experience a slight decline to a still-healthy 18%. Software growth rates will increase to 19%, compounded annually, by 1995. Worldwide, software will grow only by 14% annually through 1995.

Despite the rapid advances in the Japanese software market, by 1995 it will remain a largely underdeveloped market. By 1995, software will be only 10% of overall Japanese IT revenues. In the U.S. by 1995, software will comprise over 20% of the total IT market, and worldwide software will comprise 17% of the total market for information technology.

A Note on IDC Japan's *Japan Report*

Information in this issue has been excerpted from IDC Japan's *Japan Report* newsletter, a semimonthly analysis of Japan's IT industry. The *Japan Report* is IDC Japan's flagship publication, and is edited by Yuji Ogino. Subscription information is available from IDC Japan (Fax: 03-3234-3150) or IDC Newsletters in the U.S. (Fax: 617-423-0712).

Succeeding in Japanese IT Markets Requires Planning and Patience

Much of the current interest in Japanese IT (and automobile, toy and agriculture) markets is the result of recent examples of what non-Japanese viewers call "protectionism." But some of the difficulty in selling IT in Japan is due to cultural differences between Japan and other countries. Yuji Ogino, editor of the IDC Japan Report, discusses some of these differences as he highlights some notable successes.

Cracking the Japanese market has proven to be a baffling and frustrating experience for many non-Japanese companies. However, armed with adequate market knowledge, a willingness to compete in Japan on Japan's terms, competitive products and superior services, non-Japanese IT suppliers will find that much of the mystery surrounding Japan Inc. evaporates.

Long-term planning and commitment have paid off for a variety of foreign firms in a number of market segments. And although many foreign grievances regarding structural impediments can't be contested by Japan, the loudest voices crying foul are heard from those who haven't done their homework, or haven't put their efforts where their mouths are.

One important component of success in Japan is distribution channels. Japanese firms spend much time and money on developing the distribution channels needed to reach Japan's 130 million consumers.

Japanese consumers are brand-name conscious; quality and service are expected and demanded. Users also tend to wait and see how others utilize and appraise new technologies before purchasing. Japanese vendors in IT markets achieve product differentiation through a variety of products, frequency of model changes and exploitation of niche-market opportunities.

For example, more than 200 new PC models and 250 Japanese word processors were announced in Japan last year alone. Successful IT suppliers in Japan compete fiercely for market share first, secure in the knowledge that profits will come in due time. Due to these factors, generally speaking, Japanese companies register lower profit ratios year after year than U.S. -based companies.

High prices are another fact of life in Japan. A sizable war chest can be depleted in a few months of operation. Many non-Japanese firms meet rapid and sobering failure when the home office sets unrealistic targets for its Japanese offspring. Developing the traditional relationships necessary to secure suppliers, distributors, and end users takes time, even for Japanese-based firms.

Difficulties locating and hiring qualified personnel are another barrier for non-Japanese companies. Security-conscious workers are wary of working for non-Japanese firms. Headlines trumpeting massive layoffs by well-known multinational corporations do not breed confidence either.

Microsoft is one company that has performed well in Japan. It first entered the Japanese market in 1978, awarding exclusive marketing rights to leading software vendor ASCII. By 1986 Microsoft's Japanese subsidiary had been established. The company has since licensed MS/DOS technologies to over 50 firms, including not only PC makers, but sewing machine makers, shipbuilders and automatic plant control machine makers.

Microsoft's success was made possible, in part, by an agreement struck with PC-giant NEC in the early 1980s. MS/DOS machines in Japan are supplier and hardware specific. Microsoft set up an R&D division to accommodate the various vendors. With licensing revenue growth declining, Microsoft has high expectations for greater use of hardware-independent MS/Windows 3.0 and is now localizing Excel and Works packages, setting a total annual revenue goal of $200 million for 1994.

One area of intense interest in Japan today is RISC workstations. Having fallen behind U.S.-based vendors in the workstation market, Japanese vendors are acquiring RISC technologies from Sun Microsystems, Hewlett Packard, IBM, Digital and MIPS. These companies represent about 60% of Japan's installed base.

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Computer Industry
REPORT

1991 U.S. Review and Forecast

DID YOU KNOW ...

- that in 1991 revenue from U.S. PC sales actually decreased ...
- that for the first time ever, more money in the U.S. was spent on software and services than on all systems hardware combined ...
- that while the midrange was losing market share as a whole, Unix systems revenue soared 15% ... ?

.... if not, you should consider IDC's 1991 U.S. Review and Forecast!!

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This report presents a composite state of the U.S. market for information technology. A full bibliography would include virtually all of IDC's 1991 research, as well as the thousands of reports IDC has published over the past 27 years.

The base year for the report is 1990. The report includes early estimates on market sizes in 1991, alongside projections to 1995. In addition, the 50-page report presents 20 years of historical data, and complete analysis of each market segment, to put the 1991 results in the proper context.

The 1991 U.S. Review and Forecast is part of a series of reports detailing consistent data on worldwide computer markets. It's two sister reports are: *Western European Information Technology Spending Patterns, 1989-1995* (IDC #A-191, August 1991), *Asia/Pacific Information Technology Spending Patterns, 1990-1995* (forthcoming).

The *1991 U.S. Review and Forecast* is available to Gray Sheet readers for only $595. Call 1-800-343-4935, extension 4389 to order your copy today!

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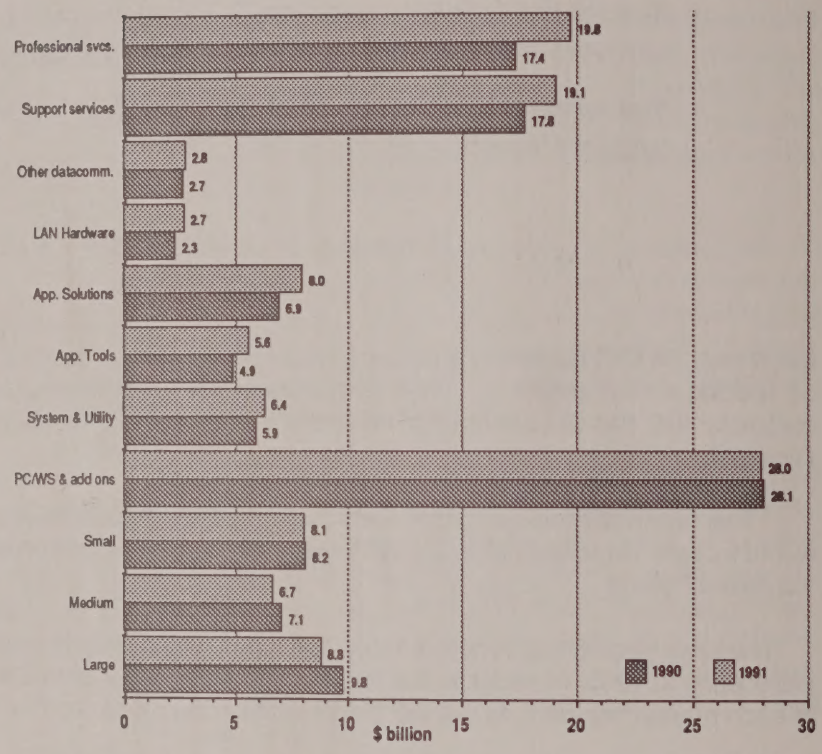

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Dear *Gray Sheet* Subscriber:

The information in this issue of the *Gray Sheet* points to one inescapable truth: IT suppliers can no longer afford to ignore Japanese markets.

But, as Yuji Ogino points out on page four of this issue, deciding to compete in Japan doesn't necessarily mean succeeding in Japan.

How can you get the inside information on who's talking to whom in Japan, on who's signing major contracts, and on how Japan's biggest users of IT are changing their buying plans?

The Japan Report.

IDC Japan's ***Japan Report*** is a comprehensive monthly newsletter written by IDC's top analysts in Japan. It gives you concise market data, financial results, late-breaking news from Japan, and updates on major technological developments in Japanese R&D labs. In short, it gives you vital access to what may be the most difficult worldwide market to penetrate. And, at $495 for one year's service,the ***Japan Report*** is a fabulous bargain.

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Very Truly Yours,

Doug McLeod
Editor

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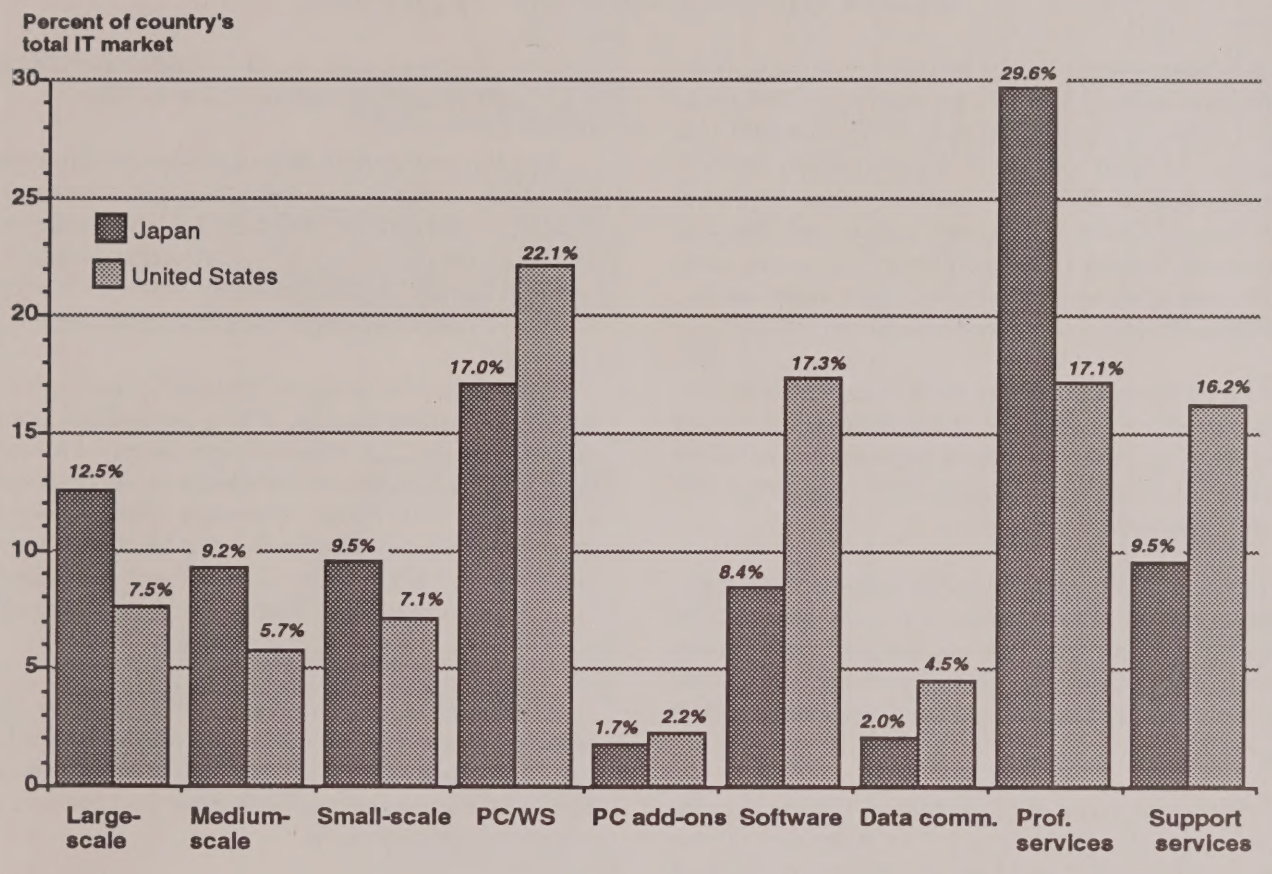
United States and Japanese 1991 IT Market Segment Proportions



Sun remains the leader, supplying workstations to more than ten vendors including Fujitsu, Toshiba, Oki and Nippon Steel, and accounting for 25% of unit shipments. Sun's large network of relationships has been key to this company's success. OEM arrangements accounted for 55% of Sun's unit shipments in 1990. Sun's Japan-earned revenue jumped from $40 million in 1987 to $530 million in 1991, and growth is expected to continue through other ventures such as the joint Sun/Fuji Xerox company, UNISOL. This company is localizing Unix application software imported from the U.S. and Europe, and is also developing commercial application packages such as desktop publishing.

Several companies, such as Microsoft Japan, Sun Microsystems, Yokogawa Hewlett-Packard, Nihon Unisys, Northern Telecom and others, owe their successes to technological development, high quality, localization of products and services, and extensive customer support. These companies have applied facilities, personnel recruitment, intricate and complicated distribution channels, unfamiliar business practices and other factors borne of "keiretsu" and like customs.

Japan's Growing Software Opportunity

While the Japanese hardware market was about 65% of the size of the U.S. hardware market, Japan's packaged software market was only 25% of the 1991 U.S. market. In addition, Japan's professional services market during 1991 was essentially equal to that of the United States. These two points indicate that Japanese computer users rely heavily on customized software. And, as a result, packaged software is a particularly lucrative growth market in Japan.

Japan's market for software is expected to outgrow every other segment of the country's computer industry. By 1995 it may reach as much as $10 billion in annual sales. Such a figure would represent 19% annual growth.

Recent market data suggests suppliers are beginning to exploit the Japanese software opportunity. Buying trends away from centralized mainframes and toward PCs and workstations have contributed to a sizable increase in packaged software product sales.

This growth has not been lost on U.S.-based software suppliers. IBM Japan, Sun, Microsoft, Lotus Japan, Nihon DEC, and Unix database vendors have all recently taken steps to assure themselves a slice of the rapidly growing pie.

The recent price skirmishes between spreadsheet giants Lotus and Microsoft point out that competition in Japan can be every bit as brutal as in the United States. But it is interesting to note that two U.S.-based software companies were responsible for introducing the changes to the Japanese market. Whether price wars develop in other application packages markets remains to be seen. Some recent PC software activity in Japan:

IBM Japan in 1991 formed the Open Architecture Developers Group (OADG) to enhance and update its Japanese-language-based library. The OADG's 23 members receive regular technical updates (on DOS/V and OS/2), and provide feedback to IBM.

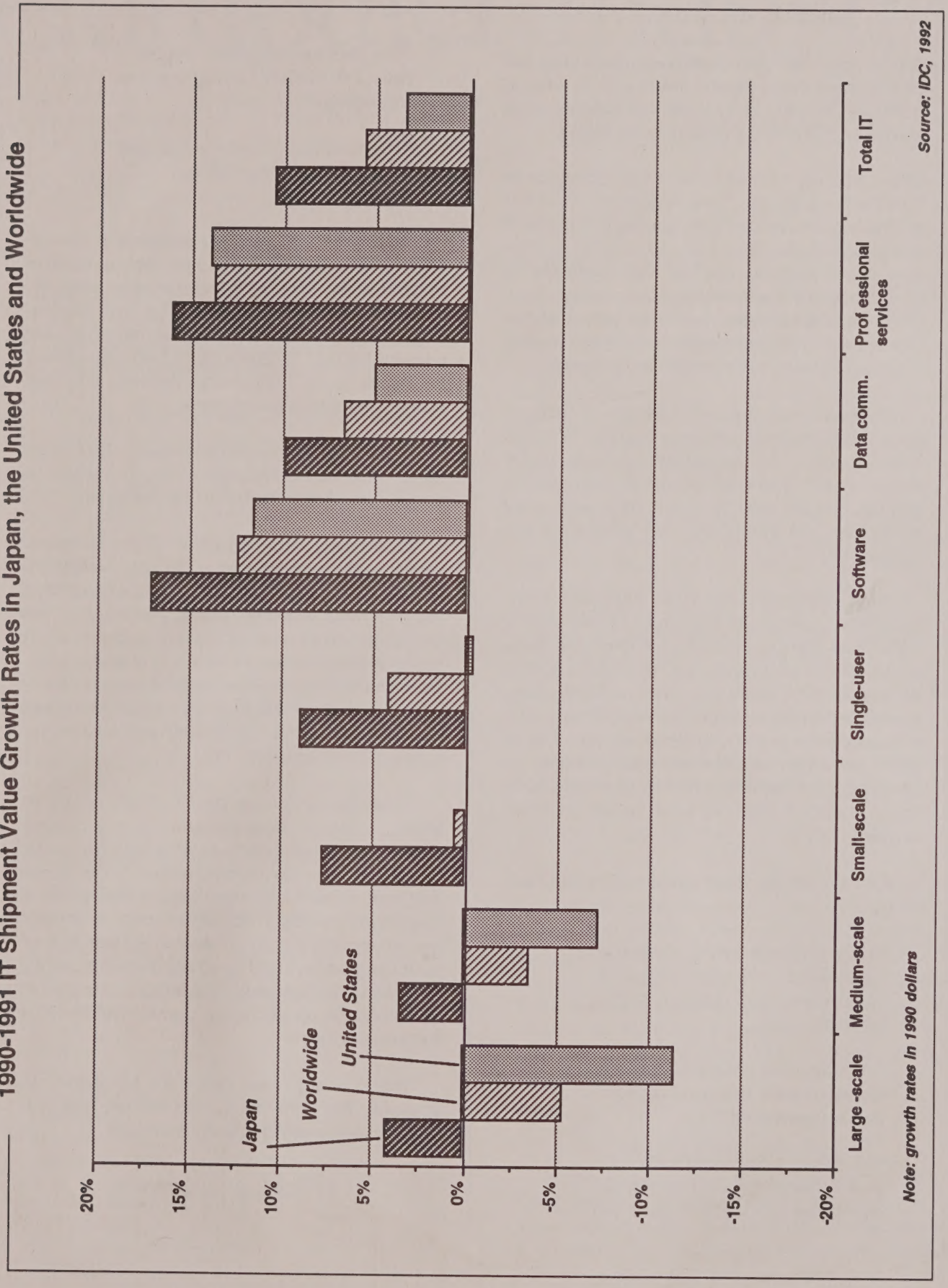
Sun Microsystems will probably open a Japanese subsidiary to SunSoft sometime in 1992 to manage development and sales of Solaris 2.0. The subsidiary will probably be distinct from hardware operations, and will be responsible for liaison between SunSoft and Sun's numerous Japanese OEM customers.

Lotus Japan owns approximately 50% of the local retail spreadsheet market. In mid-September, Lotus offered a low ($65) Windows upgrade option to stem the flow of customers to other Windows-ready spreadsheets, and to provide customers with a way of protecting their investment in 1-2-3. Microsoft countered by offering 60% discounts on Excel, but Japan's Fair Trade Commission declared that the discounts were in violation of fair pricing rules.

Microsoft recently replaced its technology-oriented Japanese chief executive with a seasoned sales expert. The company also plans to hire an additional 30-40 system engineers to bolster support services to large corporate accounts.

Ashisto is a leading independent software vendor selling inexpensive PC software. The company was founded by a transplanted native of the United States. It has sold over 300,000 packages to date, and has announced plans to sell workstation software in the future.

Informix, Unify, Oracle, Sybase and Empress compete for the rapidly growing (82% CAGR through 1995) Japanese Unix database market. Each is setting up, or has set up, local subsidiaries or agents to provide a range of services. Oracle, for example, has established a holding company in the U.S. with Nippon Steel. Oracle Systems Corporation will soon be wholly owned by the holding company.


1990-1991 IT Shipment Value Growth Rates in Japan, the United States and Worldwide
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%
Japan
Worldwide
United States
Large -scale
Medium-scale
Small-scale
Single-user
Software
Data comm.
Prof essional services
Total IT
Note: growth rates in 1990 dollars
Source: IDC, 1992

Power to the People

Grace Hopper (1906-1992) made many contributions that extended beyond the computer industry to the fabric of modern life. We asked Molly Upton, who edited ***the Gray Sheet*** *from 1978 to 1982, to reflect on some of them:*

Grace Murray Hopper was a real advocate of "power to the people." She persistently used her talents to empower others by making principles of computers understandable and usable. A committed and talented teacher, she succeeded in opening eyes and minds in and out of classrooms. Grace proclaimed she was more proud of her influence on younger people than of her lauded accomplishments in the computer industry.

She constantly reminded people of their responsibilities to help youngsters grow. "We need to bring up young people who are going to run DP shops. We tend to forget how much young people can do. But we tend to forget they need good leadership. We should put that word back into management."

For many years, Grace was a speaker on the rubber chicken circuit. Certainly, a generation of trade press reporters is the beneficiary. Just when circuit speeds were increasing from microseconds to nanoseconds, Grace appeared on the hustings to explain, simply and conclusively, what exactly a nanosecond was and why we should care. Thanks to her, we all know a nanosecond is the time the speed of light takes to travel 11.8 inches, which she showed with a piece of wire so we could all identify with it.

And remember these quotes from the early '70s:

> "I hope we won't make the mistake of thinking we're managing hardware when we're really managing information."
>
> "A dangerous phrase is 'but we've always done it this way.' It promises to haunt you."
>
> "Micros and chips will make as much change (in this industry) as the Model T did in transportation."
>
> "We didn't try to grow a bigger oxen; I think that's trying to tell us something."
>
> "We must use common sense and parallel computers with our thinking."

Grace was a superb communicator. By extending the term "bug" (the now-famous moth in Mark I) to any errant performances in a system, she endowed the arcane technology with an identifiable analogy. But she was not infallible. She once chided that she instructed a Tokyo taxi driver in Cobol..."go to"...etc., rather than any language humans might normally speak.

Grace also had her share of spunk. Upon hearing a rumor that Cobol was dying, she shipped a gravestone express collect to the Pentagon.

Most importantly, however, Grace Hopper's contribution to the computer industry goes much further than wit and insight. She understood that the computer industry cannot passively expect the public school systems to produce the people it needs without some guidance and inspiration. She did her share and has passed the torch. Hopefully, her passing will prompt some of us to meet her challenge rather than merely pause to mutter thanks for her contributions.

How about lending a hand to your local educational facilities? An appearance by you or your employees in a classroom to shed light on fundamentals or discuss current technical dilemmas might do wonders to inspire some students and help them identify with our industry in general and your company in particular. A class tour of your company will enlighten students when they see how classroom skills are needed in business situations. Set up a liaison program with teachers for summer work.

The industry owes Grace for her efforts to empower this generation. And we owe it to ourselves to empower the next generation.

Molly Upton

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Computer Industry REPORT

DOUG McLEOD, EDITOR FEBRUARY 14, 1992 • VOL. 27, NO. 8 Published continuously since 1964.

Business Models in a Changing Industry

This year's hot topic is business models. Nowhere has that been more evident than at Goldman Sachs' 1992 Technology Investment Symposium, held February 4-6 at the Grand Hyatt hotel in New York City.

The symposium provides an excellent opportunity to meet with top management from a broad collection of the computer industry's leading companies. Over 90% of the 60 companies attending the symposium this year were represented by their CEOs or CFOs. Their presentations were, almost without exception, very frank, and were focused on how each company plans to achieve long-term success despite the tectonic shifts rocking the industry.

The companies ranged from component, disk drive, PC and system manufacturers to operating system companies, packaged application providers, and systems integration firms. Despite the diversity, almost every management team discussed one common theme: its company's business model.

Whereas in past years discussion may have focused on internationalization of business lines, "openness," cost containment, managing double-digit growth or vertical integration, this year it was models. Few companies abstained. Of those that did, they did so because they have been experiencing such solid results recently that they perhaps felt "above" such a discussion. Others did so, perhaps, because they are currently undergoing painful or threatening business-model change.

The primary reasons for a focus on business models are clear. The most significant is the recent, rapid changes in the value chain of the computer industry. Traditional computer suppliers now find their products economically obsolete. Open systems companies find that their products are competing in a commodity market. Computer industry dis-integration (the *Gray Sheet* 27:4, December 6, 1991) demands a very clear business strategy.

Another reason for the internal focus of the discussions is the state of the worldwide economy. In bad times even the most cautious managers need to reassure themselves they're well positioned.

At no time in recent memory have such fundamental questions been raised so regularly or so broadly within the industry. Companies have, apparently, spent a great deal of time defining the specific computer business in which they compete. Even highly profitable companies have jumped aboard. In this issue we present a summary of several of the most salient points of some of the key presentations.

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Apple Computer Inc.

Apple management discussed several of the company's more notable (and less publicized) achievements of the last 24 months. Among them are a reduction in time-to-market for systems products

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from 30 months to 12 months. In addition, QuickTime has been the most quickly adapted new technology since the introduction of the original Macintosh. Apple's systems strategy is now built around "hit products" that make Apple more like "a company in the movie industry than a company in the computer industry."

Management believes that much of the downward movement of Apple's dealer margins has already happened. Despite the advancements of competitive products, and despite the Mac's eight years on the PC market, Macs still command a 15% price premium over DOS machines. And, unlike DOS machines, Macs are fairly price elastic. Price reductions have a much more noticeable effect on shipments of similarly priced DOS machines.

The company reiterated its new three-tiered strategy: exploitation of core markets with the Mac through the end of the century is the first component. During this period the Macintosh will remain the largest singular contributor to Apple's revenues and profit. The second tier involves spreading Macintoshes into enterprise environments, with POWER-based products, and as a result of collaboration with IBM on other products and adjuncts. In the future, Apple management sees the company moving into consumer electronic markets with a new series of products called "digital assistants."

Borland International

In the approximately 100 days since the Ashton-Tate takeover, Borland's primary focus has been consolidation. It has integrated the two disparate database lines, completed organization changes, and consolidated physical plants. The new company now employs about 2,000 people, down 750 from September, on its way to full employment of slightly over 2,000 expected in March.

Borland reiterated its intent to offer Windows versions of QuattroPro and Paradox that leapfrog, not merely keep up with, the competition. As a result, those applications will ship only when they meet that criterion ... probably by the end of the first half of 1992. Indeed, Borland management feels the company has a one-year (Microsoft) to two-year (Lotus) lead over its major spreadsheet competitors. The company calls the two products the "first to use true object orientation."

Borland rejects the idea that it should mimic Oracle's strategy by developing server products. A better strategy will be to stay attuned to selling Paradox and dBase Windows products on Novell networks — "about 80% of the market." Borland's sales will remain at approximately $250,000 per employee. The company will continue to focus on selling "zillions of packages" rather than try to sell onto more complex systems and drive per-employee revenue down (because of the greater degree of support necessary).

Computer Sciences Corporation

The company's recent efforts at diversification away from a business mix overly dependent on the federal government have been largely successful. Since 1986 CSC's U.S. commercial and international lines of business have grown by 22.6% and 19.5%, while U.S. federal government revenue has grown only by 12.8%.

CSC took a large step into the commercial business with the recently signed General Dynamics agreement. CSC paid approximately $200 million for three GD data centers, as well as all GD computer and telephone equipment residing outside the data centers. The ten-year agreement, valued in total at approximately $4 billion, will generate between $380 and $400 million for CSC this year.

The GD agreement is not a fixed-price contract. At CSC-GD shared facilities pricing is based on costs plus an incentive rate depending on utilization of specific devices and services. At dedicated facilities owned by CSC, prices are determined by cost plus a percentage of profit.

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CSC sees a lucrative opportunity in providing outsourcing and professional services to second- and third-tier aerospace companies that are coming under greater and greater financial pressure. The key for CSC is to convince potential customers of the absence of conflicts of interest derived from doing business with several companies competing in the same market sector.

The company portrays itself as the leading independent provider of professional services in the industry. In competition with EDS, CSC positions itself as a better partner.

Dell Computer

Dell Computer attributes its success to an efficient distribution system, the ability to deliver high-quality value-added services, ability to get products to market quickly, and to building brand-name momentum. The company's strategy is to "surround" customers with customer-driven R&D, service and support, and custom manufacturing.

The company has developed the following highly-segmented model of its major customer groups:

Dell's small and medium-size businesses and home office customers are highly price sensitive and seek the greatest possible value. Dell uses several tools to reach these customers and deliver value: catalogs, price promotions, magazine advertising, software bundling, telemarketing and teleconference kits.

The company's F2000, government and medical customers seek — above all — quality, reliability, portability and compatibility. To reach them, Dell has established a position called "relationship manager," a person who maintains offices at the customer's site. Dell's executive briefing centers host approximately two customer organizations daily. The company has organized "Dell days" with other hardware manufacturers and software companies at customer locations. It has also established "microcenters" — internal stores — at its largest customers' sites.

Dell's VARs demand quality products, flexible terms and an ability to create synergy between Dell and the VAR's customers. To meet these needs, Dell provides customized manufacturing: building individual systems to order, and shipping them to the VARs' customers. It provides inventory management: receiving third-party hardware and software for the VAR, cataloging it, building systems, customizing the installations (often with customer-developed applications which Dell maintains at its warehouse), and managing the billing process for Dell and the VAR. Dell also provides financing options for VARs and their customers.

Dell's service story is equally compelling. It provides a variety of support hotlines and on-site service options. Most system buyers also buy hardware service contracts at the time of system purchase. Free support provides additional security, but not at great cost. Customers call Dell's support hotline an average of 1.3 times, and each call lasts an average of 6 minutes. If the customer doesn't call within the first 30 days, he or she will likely not call at all.

Each of the three segments is exhibiting impressive growth. The small-business/home segment represents 39% of current sales and is growing at 57% (measured in the first nine months of FY92 against the same FY91 period). The F2000 segment represents 45% of current sales and is growing at 53%. The VAR segment represents 16% of current sales and is growing at 119%.

Digital Equipment Corp.

Management positioned Digital as "the company that's going to try to make open systems work." Digital's problem can be highlighted by one simple fact: in 1991 it shipped 40% more MIPS than in 1990 ... for approximately 7% less revenue. The question is, according to management, is there enough "middleware" — software and systems integration business — to keep the company going while the hardware infrastructure changes?

Digital is in the process of developing "different business models for the different businesses we're in ..." which range from semiconductor, disk drive and system manufacturing to PC distribution, "middleware" and other software. It claims the ability to objectively judge different businesses by different criteria, despite the lack of structural separation. The company justifies recent commitments to semiconductor manufacturing by claiming "world-class" semiconductor design and manufacturing capabilities.

A central question for Digital's management is to identify and develop the internal means required to get the company excited. Management agreed that Digital might be faulted for not being aggressive enough in transforming the company. In fact, while Digital has indeed been restructuring throughout 1991, the company still has approximately $800 million in restructuring reserve at yearend.

Microsoft Corporation

Few companies in the computer industry can describe such a rosy financial picture as Microsoft. It came as no surprise, then, that Microsoft's management focused on the company's financial results, and did not feel obliged to discuss business models or competitors' products. Some highlights:

The company's financial results remain impressive, largely due to very strong applications and systems revenue growth. Revenue from Windows applications: up over 60% quarter-to-quarter (sequentially); all applications were up 58% (from CY'90 to CY'91) to $1.1 billion. Revenue from systems was up 60% CY1990-1991 to $873 million in 1991, and revenue from hardware was up 33% CY1990-1991 to $233 million in 1991.

U.S. retail sales grew 65% to $723 million in 1991. Europe was the company's largest single market in 1991: $819 million. Overall international revenue increased 53% to $1.1 billion. Revenue from OEM relationships: up 65% to $427 million in 1991.

Macintosh applications continue to show very strong growth. The fourth quarter of 1991 was a record one for Microsoft's Macintosh applications. Microsoft continues to realize more revenue per Macintosh sold than per Windows PC sold.

The last two years have been characterized by very strong fourth quarters. Nineteen ninety-two will be no different with the introduction of Windows 3.1 in March. If one-half of the 12 million Windows 3.0 customers (9 million now, 12 million by March) upgrade to 3.1 (for $65), Microsoft will realize about $300 million in additional fourth-quarter revenue. Approximately 35% of 1992 revenue will come from new products, or from major product upgrades.

MIPS Computer

Management expects all three versions (PC, SC, MP) of the R4000 microprocessor to ship in the first quarter of 1992. The company expects the R4000 to achieve 100 specmarks by the end of 1992 by increasing cache sizes and process technology shrinks. The R4000 is scalable to 150-180 specmarks before it is replaced (by the R5000 or R10000). The company expects $3,000 desktops in 1993 and $2,000 desktops in 1994.

MIPS is an enabler, selling through OEMs and partners. Customers can buy either the design (PC and systems manufacturers), the board (ARC board fits in an AT chassis), or a system.

MIPS' real potential, however, may not be in systems. The company maintains that volume RISC markets lie outside the domain of traditional computer systems. It feels that as much as 70-80% of the total RISC market will consist of imbedded microprocessors.

Novell

The company's radical shift from hardware *and* software supplier to network operating system supplier *only* is largely complete. Five years ago, revenue was derived 50% from hardware and 50% from software. Now, only 2% comes from hardware. The company is organized into three groups: interoperability systems group (a "new strategic group"), the networking systems group (with responsibility for management, messaging, WAN and Unix product development), and the Digital Research organization.

The company has increased R&D spending by 500% over the past five years; it expects to deliver a global naming service in 1992. Novell is Unix System Laboratories' largest owner outside AT&T.

International sales of Netware will be greater than 50% of all sales in 1992. Approximately 71% of Netware sold outside the U.S. is sold in Europe, 10% in the Pacific basin, 4% in Japan and the remainder in the rest of the world. Novell expects that Japan represents the company's greatest opportunity; Netware has only a 2% penetration in Japan.

Novell's management believes the company's unique ability to form partnerships with diverse

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1991 U.S. Review and Forecast

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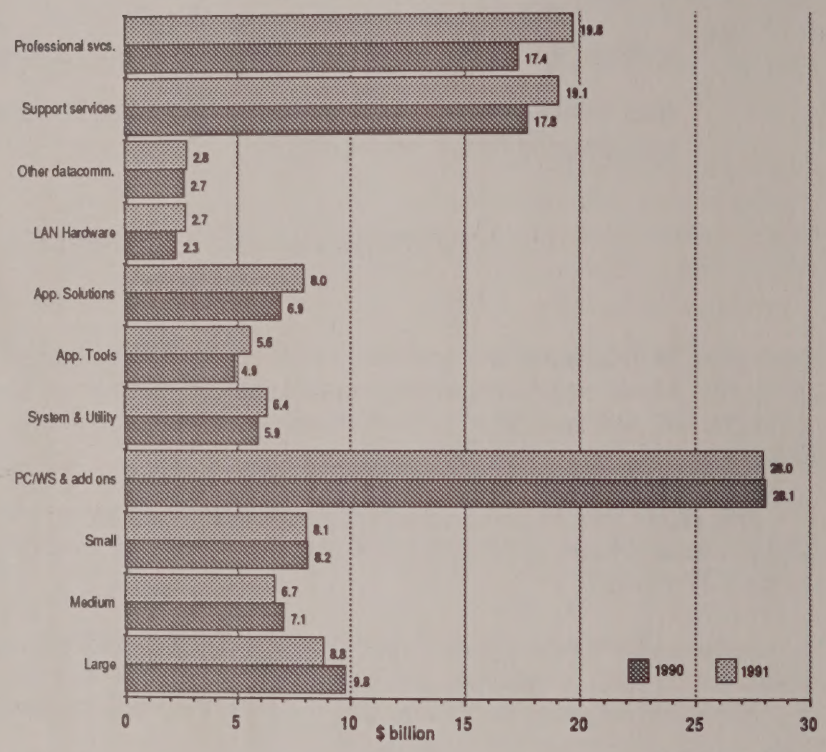

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companies in the industry is a key differentiator for it. Novell has invested in a half dozen small software companies (Cooperative Solutions, Inc., DaVinci Systems, Dayna Communications, Gupta Technologies, Serius, and USL).

In addition, Novell's ability to contribute to various industry groups that focus on LAN issues is a key strength. These relationships — including strategic engineering support, portable netware partners, service providers, software developers, and technical support alliances — shape the company's ability to provide customer solutions. Finally, the company has individual relationships with almost every major system manufacturer and many major software suppliers.

With it's core product continuing to grow well, Novell is expanding into new markets. Its acquisition of Digital research is the most visible. The company indicates that a better Microsoft/Novell collaboration benefits more than just the two of them. Novell will make new technology developed by the Digital Research division available to competition. It believes its long-term opportunities lie in using its network technology as a back end to future client/server applications.

Oracle Corporation

Management believes that while Oracle has made a substantial comeback from the negative momentum the company accrued in 1990, it still has at least two quarters to go before it is fully recovered. Oracle is still fixing some of the "business practices" problems from 1990 and 1989, but over time management believes it will return (in a year or two) to the historic margins (18-19%) it still feels are possible.

Larger revenue improvements will not begin until 2H92 for at least two reasons: the business practices problems from 1989 and 1990 and a "back-end" loading effect. By selling low-cost development systems on a per-user basis, Oracle will not recognize large amounts of revenue until new applications are rolled out across large numbers of users. So while new accounts are constantly being identified and developed, new account revenue trickles until applications are developed.

Large license deals (those over $500,000) were down 40% during the most recent quarter from the average of the previous four quarters. Management cites a tightening of business practices for the drop in large deals.

At the end of Oracle's first half of FY92, it noted the following results: service revenue increased 27%, license revenue 5%, tools and CASE 16%, networking 14%, desktops 35%, support 65% and Unix 30%. Digital business dropped by 38%. Application business has been disappointing. The company "shot itself in the foot," and is still living through some of the legacies. As a result, the application business is still in rebuilding mode.

License revenue through alternative channels in the United States was up from 11% of total business in 1990 to 28% in 1992. VARs and preferred system integrators are thriving. Preferred SIs are selling bigger (over $50,000) licenses, and more new account business through 2QFY92 than last year.

Oracle management feels that the increasing number of small dealers complements the company's changed strategy. As Oracle has moved to a per-user pricing mechanism, the company's strategy is to start small and build repeat business. As customers generate new applications, they roll them out onto production systems, building value over time.

Silicon Graphics

Silicon Graphics' goal is to become the technology of choice in large corporations around the world. The company identifies four areas: visual computing (licensed Graphics Library, Explorer and Codevision products), multiprocessing (shipping for over three years), advanced RISC implementation, and binary compatibility.

Over the past four years the company has seen tremendous price elasticity, which is partially responsible for the 35-50% growth rates.

In FY92 Silicon Graphics benefited from very strong growth in Germany (resulting from Siemens' performance), while Japanese results were disappointing. By the end of 1992, SGI hopes to have increased production to a 50,000 unit annual run rate. Actual shipments for the year will be approximately 30,000-35,000 units.

Sun Microsystems

Sun's management strongly believes that the recent reorganization of the company has been a success. The move was a result of management's frustration with managing a "big wad of business" without the ability to "rifle shoot" problems. It is also a means of ensuring that R&D resources are allocated in the right place. Now, management concludes, the individual units can be measured more accurately in their specific businesses.

SunSoft may be the biggest success. Management believes that Solaris has become a distinct brand name in just six months. And opportunities for the newly multiplatform OS are looming large. "Why port Solaris to Intel? To make money." Sun management believes that fundamentally every '386 and '486 user wants multiple threading, multiprocessing, a "real" GUI and networking. Just 5% of a 10 million-unit PC market, at $400 per Solaris license represents a "phenomenal" opportunity for SunSoft. Management believes Microsoft will have a difficult transition to NT because it is an inevitable transition that was merely delayed (hence made more difficult) because of OS/2. In the meantime, Windows on DOS is like "whipped cream on doo-doo."

SunTech Enterprises oversees the formation of new Sun companies. When considering spinning off a new company, management looks to the marketplace. If an existing company is valued in the hundreds of millions of dollars, management figures its internal return-on-net-asset-before-taxes valuation method is practical and practicable. SunTech Enterprises is growing faster than the rest of SMCC.

SunExpress has been successful in eliminating inventory problems associated with smaller orders. Between 60-80% of orders are under $5,000. SunExpress ships 90% of orders within three days, 50% the same day. The unit will gross $150-200 million in the United States in FY92. How open-ended is SunExpress? Management indicates that SunExpress is "not allowed to leave the building to sell any products." SMCC's first portable products will be sold through SunExpress.

One reason Sun wins head to head against IBM is that IBM shipped only 850 workstations in 1991, and will ship only 25,000 in 1992. Against HP, Sun is successful because customers are unsure whether HP is big enough to go it alone with PA. Sun feels its installed base and Sparc Compliant Definition strategy offer customers a less risky purchase plan. With 500,000 units (of Solaris) installed now, and 1 million installed by the end of 1992, management feels "we've got a couple of laps in — they're still in the garage trying to get fired up."

Sun management acknowledges that the Sparc clone business has languished, but still maintains optimism that the original business model is viable. Management would "not care" if Sparc increased its market presence of the worldwide computer systems business to 20% even while SMCC's share stayed at 2%. The resulting license sales would more than compensate the company appropriately.

The company proposes an analogous model to its Sparc business: the way by which Toshiba uses its own DRAM chips in its portables and notebooks, but also sells DRAM to its competitors. Management is excited about clones, but more excited about potential Sparc-based systems that fall outside of SMCC's product line, such as supercomputers (Cray, Thinking Machines, Fujitsu).

Sybase

Sybase management believes that distributed online client/server RDBMS's are the fastest-growing portion of the RDBMS market. With business decisions now made "in the executive suite, and not in the labs anymore" the company is positioning itself to take advantage of that opportunity.

The company's North American operations turned around from 1990-1991. Four core businesses — manufacturing and distribution, financial services, telecommunications, and government/defense — each contribute 20-25% of overall revenue. The company realizes 50% of its revenue from RDBMS products, 20% from connectivity products and 30% from the applications development.

Over 350 VARs are now writing applications for Sybase. Of Sybase's 3,375 customer sites, 3,000 are unique customers; almost all are organizations with sizes comparable to the F500.

Sybase is not in the applications business. While the company provides extensive application development support to VARs and end users, it has chosen not to develop packaged applications. As a result, the company's sales cycle is far different from that of

other software suppliers: initial sales are approximately $40,000-60,000. Customers use the developmental system to build client/server applications with high transaction rates running over a network. After six to twelve months of tire-kicking, and the customer has built and tested the applications, Sybase sees revenue from group licenses sold to the customer.

Sybase has seen a recent shift increase in sales to larger companies. The company's competitive capabilities have been improving. While Oracle is in nearly all of these accounts, the potential customers are listening to, and agreeing with, the company's distributed RDBMS message. Sybase management believes Oracle's impending version 7.0 will not be competitive with upgraded Sybase products.

The company's relationship with Lotus has been very positive from a sales standpoint. Working with customers has proven to be very helpful to both of them. However, development efforts between the two have been a disappointment.

Tandem Computers

Approximately 85% of Tandem's current hardware sales are derived from the proprietary Guardian line. The remainder is derived from Unix-based systems. Most recently, the company has seen very strong U.S. sales, while sales in Japan have been weak.

Management indicates that reshaping Tandem's cost structure may be the company's most important short-term challenge. This will be achieved through headcount reductions, forced vacations, time off without pay, and deferred salaries. Headcount reductions of up to 6% could result if the other measures do not provide sufficient cost saving.

On the revenue side, the company identifies three high-growth areas: intelligent networks (expected annual growth 25%), EDI (25%) and interconnectivity (30-50%). More long term, Tandem will seek to increase its consulting services business, as well as the sale of packaged applications. In addition, the company will get more aggressive in signing VARs and selling through the VAR channel.

Texas Instruments

TI's major restructuring has been completed, while the company is continuing a minor cost containment program. The restructuring has brought about a new focus on differentiated products, from CASE and CAD/CAM to its microprocessor business.

The company has moved aggressively to increase semiconductor license revenues. Between 1986 and 1990, quarterly license revenue averaged $35 million. Over the last year, license revenue has averaged over $64 million. Semiconductor revenues is derived primarily from Japan (38%) and the U.S. (28%), with smaller contributions from Europe (19%) and Asia (15%). The semiconductor business unit has made several investments with new (for TI) partners: Acer, Kobi Steel, and HP, Canon and the Singapore government.

The information technology group's minicomputer business is a "major weakness." The group is investing heavily in CAD/CAM products.

The Dis-Integration Continuum

Is it mere coincidence that the majority of the companies presenting at last week's Goldman Sachs Technology Symposium are already well positioned on the IDC dis-integration chart (see the *Gray Sheet* 27:4, December 6, 1991, page 3)? We suppose not. The most captivating, fastest growing, and most attractive companies in the computer industry have very carefully positioned themselves to benefit from the trends we identified in our general theory of dis-integration.

Two fundamental tenets of dis-integration are particularly relevant here: the absolute need for a computer company to firmly identify whether it competes in supplying technologies or integrating customer solutions, and the inexorable growth of software and services as a percentage of industry revenues.

Some companies — TI, Digital Equipment, and Oracle for example — lie toward the center of the dis-integration continuum. Digital, the company with perhaps the most compelling interconnection and integration story in the industry, is convinced that building a $500 million Alpha chip fab makes sense. In the past couple of years TI has not made much money selling computer systems hardware (until, perhaps, very recently) while its semiconductor business is now going through its own travails. It can't seem to move fast enough away from the center. Oracle may find itself with some hair-raising either/or questions: should the company be developing core RDBMS technology, or focusing on developing custom applications?

Does this analysis mean these companies are doomed — either in the short or long term? Hardly. Any company can position itself to take advantage of dis-integration. Consider Tandem's recent initiatives placing more emphasis on selling through VARs and selling packaged applications. Each move accentuates Tandem's emphasis on building core technology (in the first case) and on the other hand, providing integrated customer solutions (in the second case). While the industry is changing, it hasn't completely changed. Consider also the outlook for Dell, Sun, and Sybase.

Dell is more of an integrator than a technology supplier. It employs highly innovative ways of "surrounding the customer" with custom manufacturing and multivendor software installation and support. It's not hard to imagine that the company's custom manufacturing and integration delivery structure could add value to mediocre hardware products in sufficient quantities to sell them successfully. It has successfully created value in two areas (distribution and customer service). It creates enough value in those areas, in fact, to make up for mediocre value-add in core technologies (the hardware Dell makes is excellent — it's just impossible to add much value to MS-DOS boxes when you don't own the microprocessor technology or the operating system).

Sun Microsystems Inc. is at least equally competent as Dell ... only in a diametrically opposite market. SMCC (the hardware business) never really pretended to be a solutions-oriented company. SMI's most vigorous marketing initiative has been SunExpress. On the software side, SunSoft is focusing on writing a better Solaris to OEM to PC clone companies or other third parties, or to sell direct to end users. Across multiple distinct corporate entities, the company seems reasonably focused on supplying core technologies, and is not concerned with supplying integrated end-user solutions.

Sybase keeps its focus on distributed RDBMS technology — not applications, not consulting services. To deliver customer solutions, it relys on VARs and integrators. The company has, apparently, no illusions about supplying RDBMS solutions, from the most elemental code all the way through to custom applications.

Even the oldest companies in the computer industry, and even those companies solidly in the center of the value chain, have begun to respond to the collective phenomena we call dis-integration. Newer companies have been created to take advantage of the dis-integration. Their challenges are in some ways less daunting. Older companies must restructure and, only then, play by the new rules. Either type of company can still achieve considerable success.

Doug McKee

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DOUG McLEOD, EDITOR FEBRUARY 28, 1992 • VOL. 27, NO. 9 Published continuously since 1964.

1992 U.S. IT Spending Outlook: More Optimism than 1991

Once again, the U.S. IT industry perseveres in a weak economy. Expanding roughly at the rate of inflation, the IS community plans to sustain its commitment to information technology through conservative spending practices and cautious new implementation strategies.

As in the past, IDC has chosen to study IS behavior by compiling a mixture of quantitative and qualitative information depicting both tactical and strategic directions. In the fourth quarter of 1991, we conducted some 1,600 in-depth interviews with IS executives in the Unites States. This research produced the following major findings and conclusions:

- The extent to which this mild planned uptick actually takes place will be highly dependent on the performance of the overall economy.

- Despite these modest plans, the composition of spending continues to churn. Migration to more modern hardware and software platforms was rated as the single most important task by the survey base.

- IS executives continue to be open to new technologies with more than 80% inclined to use new technologies to improve their IS operations. Overall, interest is highest in workstations, EDI, CD/ROM, multiprotocol routers and software tools such as CASE.

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- Roughly 30% of the survey base is moving toward a client/server architecture. Significantly, understanding of this term has increased markedly. Only 15% of U.S. customers consider the term to be a mere buzzword, down from 28% in last year's survey.

- Roughly half of the sites surveyed are pursuing an open systems strategy, although their means of achieving this aim can vary widely. About one-third of the sites are pursuing a Unix-oriented strategy.

- Interest in systems integration continues to increase with more than 20% of the base either using or considering such an option. Outsourcing remains of significant interest to large mainframe customers.

- DOS and DOS/Windows-based PCs continue to gain strength. With the exception of the DEC environment, there is still little commitment to the Apple MacIntosh among the MIS community. On the other hand, use of MS-Windows continues to expand. By the end of 1992, 44% of all PCs in the survey base will be running a version of Windows, up from 25% in 1991. On a less optimistic note, the 1992 market for PC hardware is expected to remain flat.

- Use of local area networking continues to increase. By the end of 1992 some 60% of all PCs at these sites will be on a LAN, up from 44% today. Novell continues to be the overwhelming supplier of choice, capturing two-thirds of all sites that have made a strategic LAN decision.

- The most important uses of internal IS staff are for systems/network maintenance and

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developing new applications. Not surprisingly, the two most important areas of required training are (1) internal standards and procedures and (2) operating systems and network management. These areas greatly outweigh the need for training in Unix, client/server architectures and CASE.

More detailed analysis follows.

Estimated 1991/92 IS Spending Growth

Total IS spending grew somewhat less than expected in 1991, with growth estimated at 3%, while the customer base last year anticipated a 4.8% growth. Most likely, this 1.5% drop can be explained by a worse than expected economy.

This year, the base again expects to grow at just under 5%. Some 45% of the sites are forecasting an increase; 15% are planning to decrease spending with the remainder expecting no change. Some 8% of all sites in the U.S. characterize themselves as being in an environment of long-term contraction.

Current Budget Allocation

The proportion of the total budget allocated to IS personnel is roughly equal to the combined budgets for multiuser and PC/workstation hardware. Collectively, hardware and IS staff account for two-thirds of total IS budgets. The remaining third is distributed among packaged software, services, networking and all other costs.

Although positive growth is anticipated in all product/service areas, the increases are consistently modest. The most active areas are expected to be end-user products such as PCs, workstations, and servers, as well as packaged software.

Most Important Challenge for 1992

The most important challenge for 1992 will be migrating from older systems to more modern hardware/software platforms. This factor rated slightly higher than controlling costs or integrating central and end-user resources, and much higher than recruiting and retaining top-quality staff.

These priorities vary somewhat by host environment. IBM mainframe and AS400/System 3X sites are more concerned with controlling costs, while DEC VAX VMS sites are focusing more on integrating central and end user resources into a single enterprise information system. Not surprisingly, the highest levels of migration interest are found in the other mini and other mainframe sectors.

Acceptance of New Technologies

Acceptance of new technologies also varies widely among host environments, but overall, EDI, workstations, CD/ROM, and software tools such as CASE and object-oriented programming scored very well. Interest in multimedia applications and image processing may gain momentum in 1992, as suggested by the significant "exploratory" responses, especially from the large IBM mainframe sites.

Overall IT Investment Strategy

The question of system downsizing/upsizing/rightsizing has become an increasingly important part of a customer's investment decision making. IDC's research shows a clear but not overwhelming movement to smaller platforms in 1992.

More than half of all sites expect to maintain their current mix of central and distributed systems. On the other hand, 18% are consciously moving applications off centralized hosts onto small platforms, whereas only 8% are upsizing distributed applications onto a larger host. Additionally, 20% of the sites are focusing most new application development on small systems.

An equally important question has to do with the balance of hardware and software spending within individual customer sites. Here also the data support the conventional wisdom that future investment will be geared less to hardware and more to software and services, but not to the extent that many have suggested.

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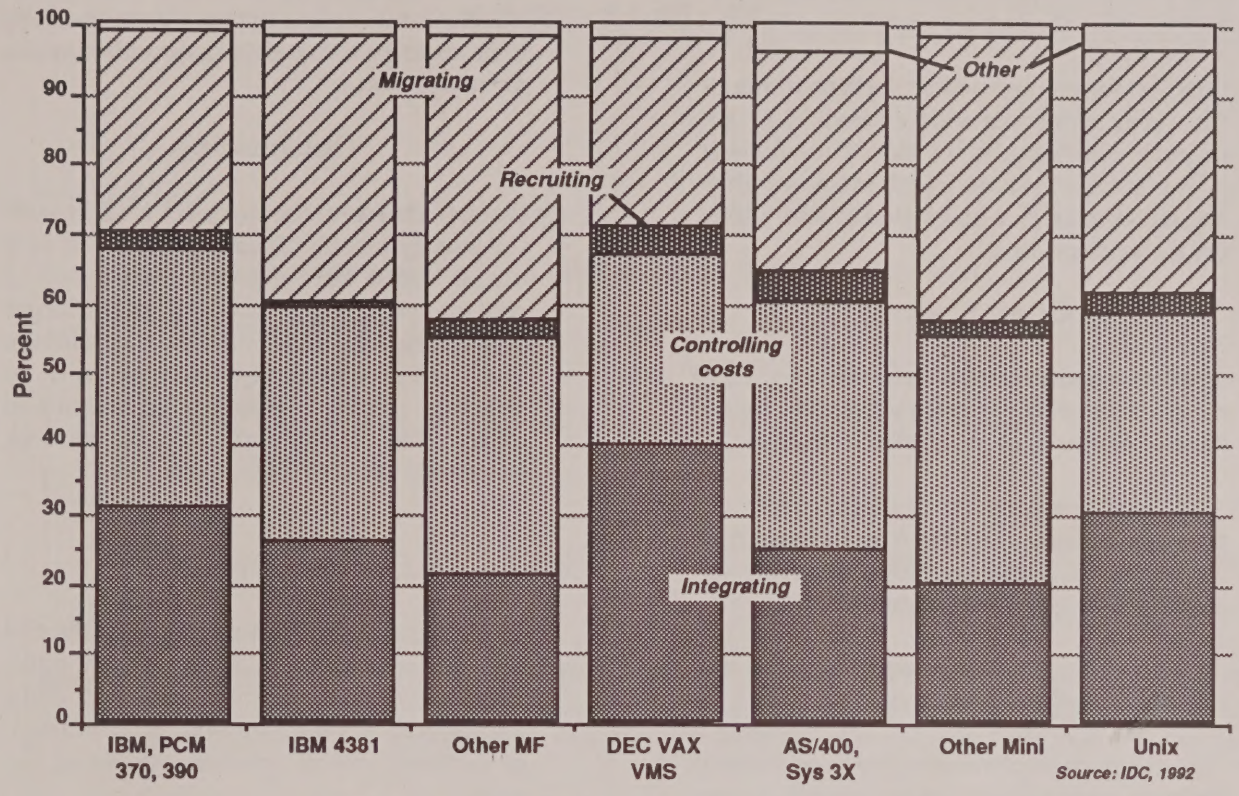
Most Important U.S. IS Challenges



Question: **"Which one will be your site's most important area of focus over the next 12 months?"**

Migrating: Migrating from older systems to more modern hardware and/or software platforms.
Recruiting: Recruiting and retraining top quality IS staff.
Integrating: Integrating central and end-user resources into a single enterprise information system.
Controlling: Controlling costs and improving the financial justification for continued IS investment.

About 25% of all sites expect to continue to invest heavily in hardware, software, and services; 24% will focus mainly on software and services, and just 15% mainly on hardware. The remaining sites are either flat or contracting.

Technology Implementation

Along with new technology comes changing patterns of implementation as the IT industry moves through new generations of computing. Some of the most frequently discussed topics in the IT industry today are those of client/server architectures, open systems strategies, outsourcing, and systems integration.

In general, the least enthusiasm for these new approaches comes from IBM AS400/System 3X customers, while the IBM mainframe and Unix environments tend to be the most aggressive in terms of their plans for new computing schemes. The highlights of this implementation research are outlined below.

Client/Server

- Use of client/server computing continues to be most prominent in Unix environments, IBM mainframe sites, and DEC VMS sites, while AS400/System 3X sites remain the least interested in this approach.

- IS professionals seem to be gaining a better understanding of the term "client/server." The number of sites labeling the term a "buzzword whose meaning is not at all clear" is down sharply from last year's survey. However, better understanding does not

necessarily translate into more migration, as many customers continue to take a wait-and-see attitude.

- Most customers see a client/server architecture as an enterprisewide endeavor, as opposed to a LAN-based solution. They also see client/server systems used for a roughly equal mix of office automation and mission-critical applications.

Open Systems

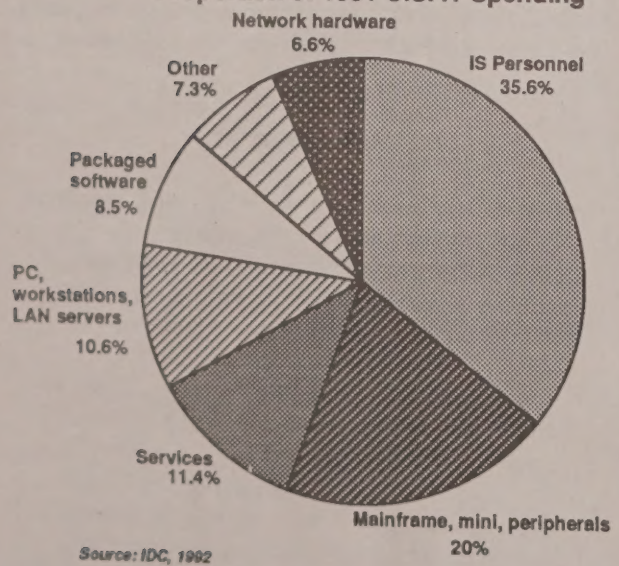
- Implementation of an open systems strategy received mixed reviews showing an even split for and against pursuing such a strategy.

- The most pronounced deviation from the mean came from the IBM AS400/System 3X environment, with only 28% of this customer base pursuing an open systems approach.

- Not surprisingly, Unix sites overwhelmingly show the most positive results.

- The means of implementing an open systems strategy vary widely among senior system environments. The most common response was to adopt a standardized operating system. However, IBM 370/390 and VAX VMS sites are more likely to use common development tools, programming languages, and database software to implement an open systems plan.

Proportion of 1991 U.S. IT Spending



Source: IDC, 1992

- IBM mainframe sites, including 4381 sites, are also more likely than any other senior system environment to move to an open systems strategy via an enterprisewide communication system.

Outsourcing

- Outsourcing continues to gain attention, with the survey results indicating relatively low usage levels, but relatively high levels of consideration, especially within the larger mainframe sites. IBM S/370 sites are still the focal point for most of this opportunity. In general, interest in outsourcing extends to both the data center and corporate network environment.

Systems Integrators

- Use of systems integrators is also on the rise, with the appeal spread fairly equally across the major host environments studied. Overall, about 25% of the base is either considering or currently using systems integration services.

- Of those sites considering the use of systems integrators, the larger mainframe sites tend to see the systems integrator's role as one that can be called upon to provide limited one-time or project-based assistance, while the smaller minicomputer sites are more likely to use system integrators for most or all major IS activities.

- Customers report that cost had little to do with the rejection of a systems integration strategy. The most common reason cited for not using a systems integrator is customer satisfaction with existing resources and services.

PC and Workstation Purchase Growth

Consistent with previous IDC estimates, this year's IT survey shows that PC unit purchase growth will remain flat in 1992 compared to 1991. However, the overall budget for PCs, workstations and servers is expected to expand as users upgrade their hardware and try to get more out of their investment. The survey suggests that unit increases will come primarily from VAX VMS and other mini environments.

THE GRAY SHEET
Computer Industry
REPORT

1991 U.S. Review and Forecast

DID YOU KNOW ...

- that in 1991 revenue from U.S. PC sales actually decreased ...
- that for the first time ever, more money in the U.S. was spent on software and services than on all systems hardware combined ...
- that while the midrange was losing market share as a whole, Unix systems revenue soared 15% ... ?

.... if not, you should consider IDC's 1991 U.S. Review and Forecast!!

Each year 34 IDC research programs report on the state of the U.S. information technology (IT) market in 34 specific market segments, whether mainframes or PC software, Unix workstations or systems integration contracts. IDC has assembled that information in a single, comprehensive report, the *1991 U.S. Review and Forecast.*

This report presents a composite state of the U.S. market for information technology. A full bibliography would include virtually all of IDC's 1991 research, as well as the thousands of reports IDC has published over the past 27 years.

The base year for the report is 1990. The report includes early estimates on market sizes in 1991, alongside projections to 1995. In addition, the 50-page report presents 20 years of historical data, and complete analysis of each market segment, to put the 1991 results in the proper context.

The 1991 U.S. Review and Forecast is part of a series of reports detailing consistent data on worldwide computer markets. It's two sister reports are: *Western European Information Technology Spending Patterns, 1989-1995* (IDC #A-191, August 1991), *Asia/Pacific Information Technology Spending Patterns, 1990-1995* (forthcoming).

The *1991 U.S. Review and Forecast* is available to Gray Sheet readers for only $595. Call 1-800-343-4935, extension 4389 to order your copy today!

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1991 U.S. Review and Forecast

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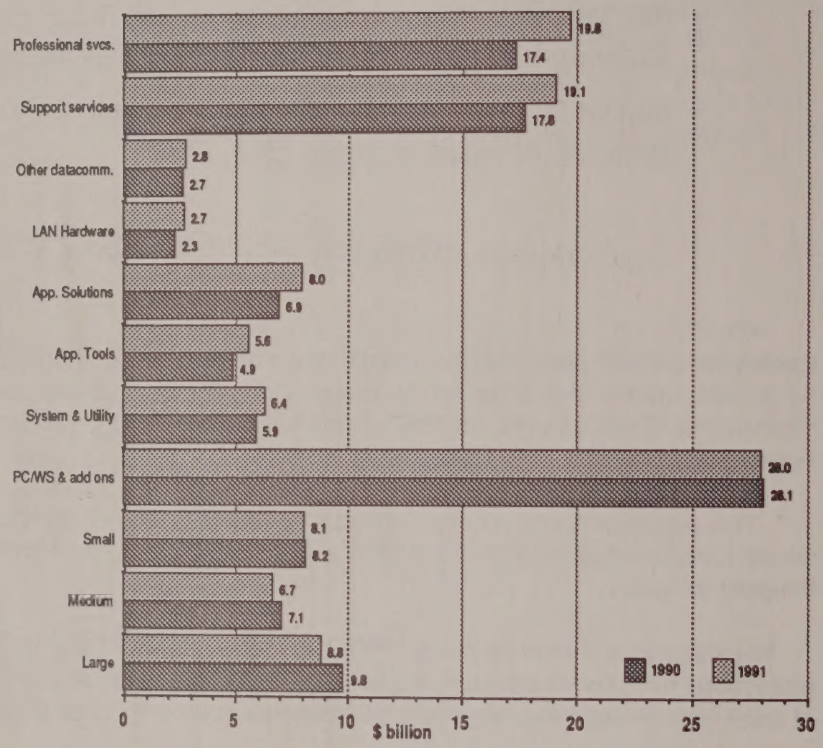

Source: IDC, 1992

U.S. Computer System Trends, 1970-1995
- Dis-integration
- Downsizing
- Operating Environments
- Maturation

HOW TO ORDER: **The *1991 U.S. Review and Forecast* is available to Gray Sheet readers for only $595.** To place your order for the *1991 U.S. Review and Forecast*, simply call Linda Rich at (800) 343-4935, ext., 4389. Or, you can fax Linda at (508) 935-4021.

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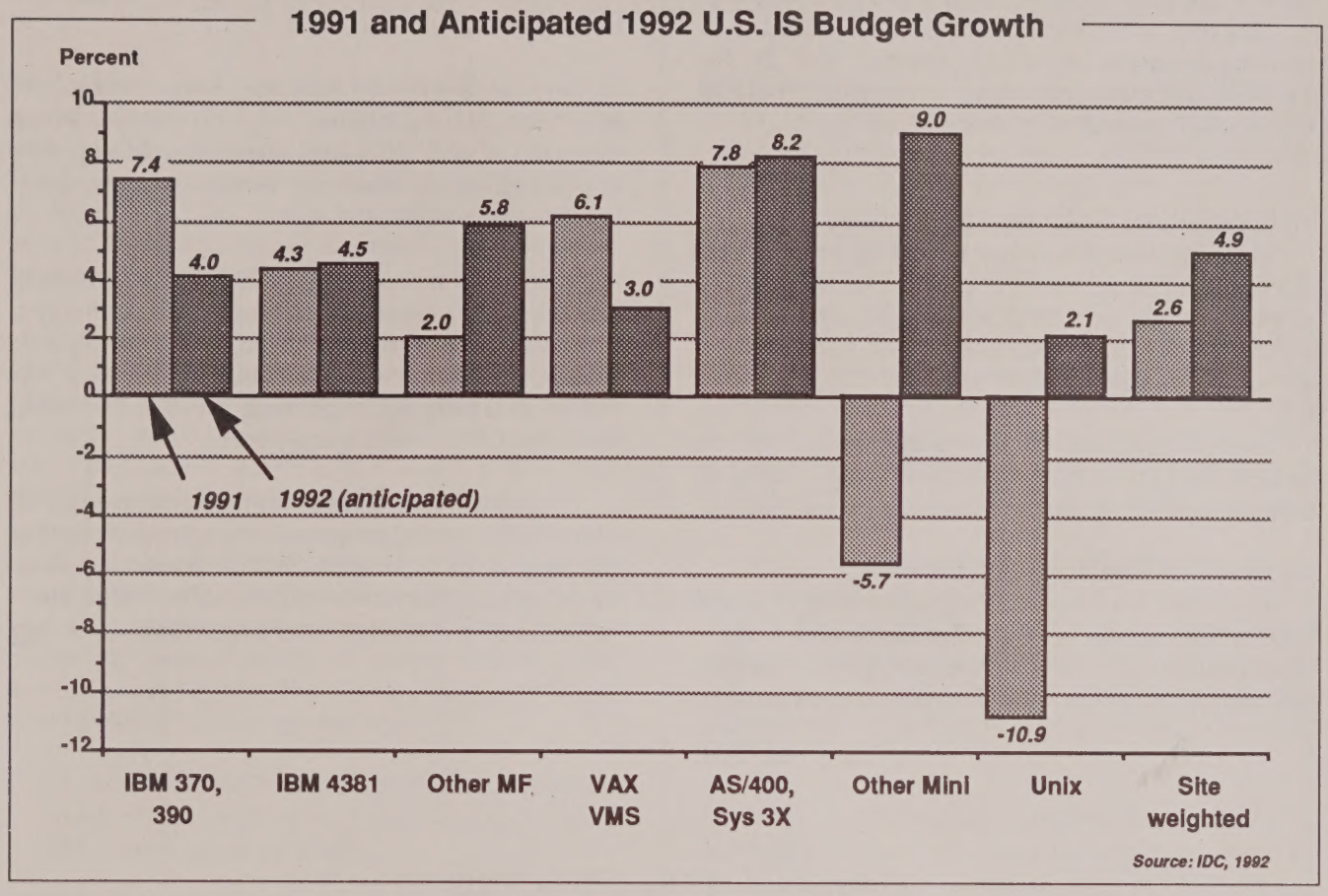


PC Saturation Levels

The size of the site appears to have some correlation with PC saturation levels. Smaller minicomputer and Unix sites are more likely to have reached some level of PC and workstation saturation than are the larger mainframe sites.

Perhaps the most interesting finding in this area is the strong interest in workstations and the surprisingly low commitment to the Apple MacIntosh. In fact, with the single exception of the Digital accounts, only about 2% of the sites surveyed are increasing their commitment to the Apple platform. Digital accounts are also the only ones where Apple's PC share is more than 10%. Apple still has a long way to go to win the support of the IS community.

PC Operating Systems

Over half of the customer base has chosen to standardize on a single PC operating system. Among those who have decided, over 90% are standardizing on either DOS or DOS/Windows.

Indeed, use of Windows is growing rapidly. By the end of 1992 over 40% of the installed base of business PCs will be running Windows, up from 25% at the end of 1991 (Figure 8). In contrast, fewer than 1% of the sites have standardized on the Apple MacIntosh platform.

Local Area Networks

Local area networks are becoming an increasingly important part of IS activities. Some 60% of the PCs within the survey base are attached to a LAN, up from 44% in 1991. Only within the AS/400 group is the percentage of PCs on a LAN less than 50%.

Not surprisingly, Novell, with more than three times the installations of any other competitor, is by far the dominant LAN software vendor. Some two-thirds of those companies that have made a strategic commitment to a LAN operating system chose Novell, more than four times that of its nearest competitor, IBM.

Software and Applications Development

This part of the survey focused on the utilization and requirements for existing internal staff. It also examined the expected balance between internal and external software development spending.

Allocation of Software Spending

The allocation of software spending among internal vs. external resources appears to be roughly the same as it has been in the past five years, according to survey results. In general, about half the spending activity is internal and half external.

Interestingly, AS/400 customers are most prone to develop software internally, with two-thirds of all software spending geared to internal development.

IS Staff utilization and training

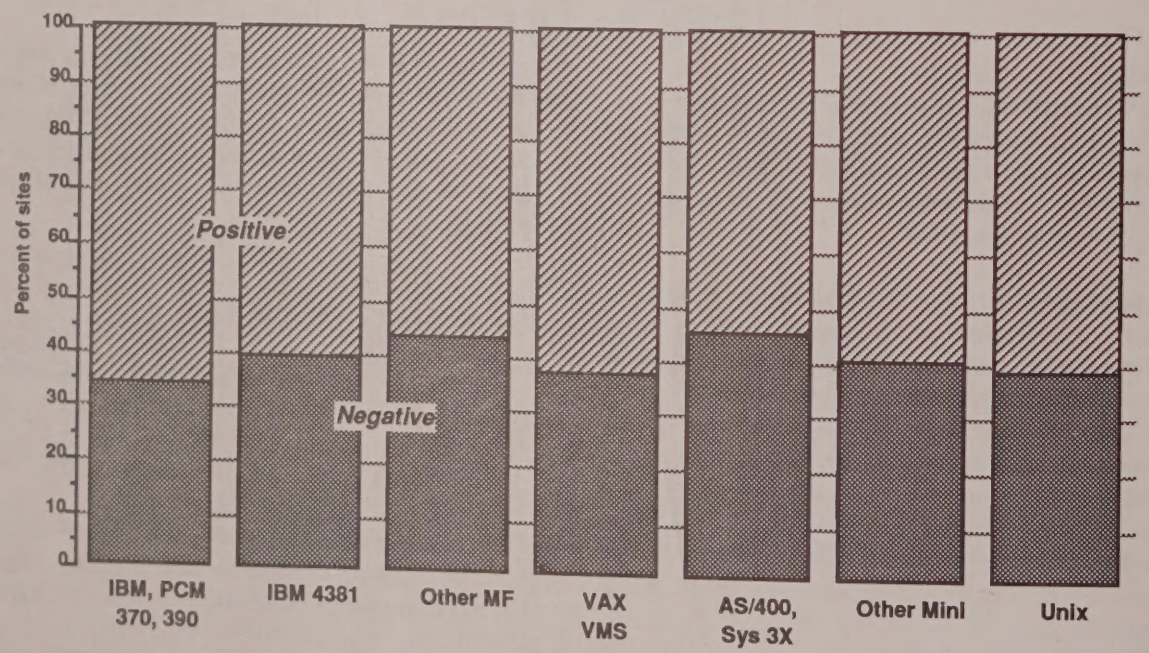
The areas that consume the greatest proportion of staff time are systems/network maintenance and the development of new applications. The remaining proportion is spread roughly equally across tasks like systems conversion, providing end-user access and building new user interfaces.

Perhaps the most interesting variation by host environment is the relatively high proportion of time that Digital and Unix sites spend developing new applications compared to systems software and network maintenance.

In terms of managing this large investment in IS personnel and meeting their software challenges, customers are primarily focused on improving their internal standards and procedures. This need was followed closely by improving skills in operating systems and network management.

In contrast, emerging technologies such as CASE and object-oriented programming were described as not important by roughly 50% of the survey base. Training in open systems and client/server architectures is also a matter of lesser importance.

Overall U.S. IT Spending Activity



Positive: Our needs are growing rapidly, we continue to invest heavily in hardware, software and services.
We have about enough hardware horsepower; we are now investing mostly in software and services.
Most of our software is in place, but we need to increase our hardware capacities.

Negative: Our IS environment is basically stable and we don't anticipate major growth in hardware, software or services.
Our IS environment is contracting. Spending will be flat to down in subsequent years.

Source: IDC, 1992

IDC's 1992 Customer Directions and Spending Patterns Research

Information in this issue of the *Gray Sheet* has been excerpted from IDC's *1992 U.S. IT Customer Directions and Spending Strategies: Host Environment Usage and Plans*, our annual survey of information systems professionals. This year's research focuses on the current IS climate, future strategies, and anticipated spending projections.

More specifically, the research is designed to provide a comprehensive view of U.S. demand-side expectations regarding IS spending behavior, implementation plans, and acceptance of new technologies across all major IT sectors — PCs, LANs, mainframes, software, services, and internal staff activities.

This *Customer Directions and Spending Strategies* study presents IDC's research results by the senior host computer environment at each site. Another report will present the same survey data by major vertical market sector. The primary objectives for the overall 1992 IT survey project are:

- To better understand the 1992 customer environment in terms of current priorities and overall attitudes toward IS change.
- To identify implementation strategies in key areas such as client/server architectures, open systems, acceptance of the Unix operating system, outsourcing, and systems integration. The survey also attempts to understand the motivations behind these decisions.
- To determine current and future usage patterns for key product areas like PCs, workstations, LANs, operating systems, software, and emerging technologies such as image processing, EDI, and CD/ROM.
- To estimate both actual 1991 spending change and anticipated 1992 spending levels in overall terms as well as broken down by the following major areas: IS personnel, mainframe/mini hardware, PC hardware, packaged software, networking, and services.

In short, the project is designed to present a comprehensive view of IS plans, attitudes and concerns. Although the research contained in this report is for the U.S. market only, IDC is currently conducting nearly identical research in the U.K., France, Germany, and Japan, project work which will be completed in the March/April time frame.

Methodology

The survey consisted of some 1,600 telephone interviews conducted between October 7 and December 13, 1991. The telephone format was essential in meeting our overall response rate goal of at least 50%. Government and education sites were deliberately excluded from the sample base since these organizations have different procurement practices best studied through a separate research process.

The survey sample was stratified by senior host environment — IBM S/370, IBM AS/400, DEC VMS, Unix, Other mainframe, other mini — to provide a manageable base with which to project results to the U.S. universe. The key missing part of the universe — PC-only sites — is being covered through a separate IDC survey effort.

To project the survey results to the entire U.S. IS market, two different weighting techniques were selected to show two important but different views of today's business.

First, a site-weighted process was used to project aggregate behavior of all sites in the United States. Since there are many more minicomputer sites than there are mainframes, this view of the market is heavily influenced by small-system populations.

To better indicate the purchasing power of larger sites, a budget-weighted scheme was also employed. This process was used to project the overall behavior of the marketplace on a share-of-spending basis.

Additional Information Available

Readers should be aware that these results reflect only one view of today's U.S. IT marketplace. The survey data can also be cut by customer budget size, number of site employees or other criteria.

For a complete discussion of IDC's survey methodology, please contact Carol Page at (508) 935-4555.

The Shortfalls of Demand-Side Research

Almost any business can benefit from learning more about its customers. During times of fundamental change in an industry, understanding customers' behavior becomes even more critical.

Broad-based surveys of computer users are one important way of determining what computer users want. They are an important component of IDC's understanding of customer bases, their migration paths and buying patterns. Primary survey data contribute significantly to our understanding of some of the underlying dynamics that continue to change the shape of the industry.

But survey data provide only one view of industry spending trends — the user view. Surveytakers, IDC included, can never completely determine the extent to which users' perceptions have been tainted by what they read in the trade press, by what the hear (from companies like IDC), or by what their management may want them to think. The dilemma is not dissimilar to that of pollsters in New Hampshire or South Dakota.

Consider a single voter in South Dakota. She could explain who she will vote for in next week's primary with a relatively high degree of certainty. But how about in 1996? Who she will vote for depends on who's running, on the issues of the day, and on a host of other factors. Asking her now who she will vote for in 1996 has little real meaning. She's not lying, she just doesn't know.

In addition, survey results are representative only of what customers expect to happen in the near short term. The appearance of discrepancies between what they expect, and what actually happens, may be a function of the success with which marketing organizations get customers to change their plans. Even the best laid plans may succomb to a good pitch.

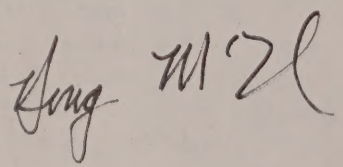
In general, IDC uses user research to scan the short-term horizon. Beyond one or two years, users' plans vary wildly. Companies like IDC probably know much more about technology suppliers two to five-year plans better than the users do. For example, how many users really know how deeply object code will infiltrate their information systems in five years?

To ensure a more accurate view of users' long-term spending plans, the survey results presented in the previous pages should be tempered by IDC's understanding of other factors — the behavior of suppliers of technology, the implications of the technology itself, and product-cycle effects.

To be most useful, survey data needs to be compared across time. How do today's answers stack up against yesterday's. Or, next year's as opposed to last year's? Those comparisons provide more actionable information in the short term, better, probably, than outsiders' opinions. But for longer term information, relying on market-watchers like IDC, with analysts around the world monitoring every segment of the industry, will yield far more accurate information.

Another way of rendering the raw data useful is to cut it according to its most important characteristics. In this survery we looked at the data according to senior system, and across vertical markets. Some of the most interesting results can be drawn from looking at the differences between the extremes in each category.

Perhaps most interesting will be discovering how users' perceptions vary across geographies. With data from IDC's surveys in Japan and Europe now coming in, that will be the subject of a future *Gray Sheet*.



IDC's 1992 U.S. user research is now available. The results of 1,600 surveys have been analyzed in two separate reports which segmented the data according to the senior host at the site, and by the vertical market of the respondent. For further information on either *1992 U.S. IT Customer Directions and Spending Strategies: Host Environment Usage and Plans*, or *Vertical Market Usage and Plans*, please contact Carol Page at 508-935-4555 or your local IDC representative.

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR MARCH 13, 1992 • VOL. 27, NO. 10 Published continuously since 1964.

EDS: More than Just the Right Place and the Right Time

The view that software and services would someday outgrow almost every other segment of the worldwide computer industry has been getting progressively more axiomatic since 1969. That was the year IBM officially announced a "new way of doing business," more familiarly known as software unbundling.

That announcement, and the growing success of small companies like EDS, led to further unbundling of service-based products at IBM (hardware maintenance, support services, professional services, consulting and systems integration, among others) and paved the way for the growth of major segments of today's information technology (IT) industry: third-party distributors, independent software vendors and service providers. Since then the industry has passed similar watersheds at an accelerated pace.

In 1981, independent hardware distributors received a huge boost with the release of the first IBM PC. In 1988, Lotus and Microsoft became half-billion-dollar companies, and Computer Associates' sales passed $900 million. In 1991, IBM formed ISSC, EDS's sales topped $7 billion, and software and services revenue in the U.S. was larger than all other types of revenue combined.

Growth in services and software does not seem likely to abate anytime soon. Consider the following:

- Interest in systems integration is strong: 25% of all U.S. IT sites are considering using a systems integrator as of December 1991.
- Outsourcing continues to gain attention: almost 20% of IBM 370 and 390 sites in the United States are considering outsourcing some of their operations.
- End-user spending on IT is gradually shifting from internal information system (IS) structures to external suppliers of IS services. The worldwide IT market was about $325 billion in 1991 — revenue flowing from users to suppliers, "external" spending in IDC's parlance. Many more billions were spent by those same companies "internally" on IS staffing, training, operations and maintenance. Markets for services and software appear to grow as a portion of that internal spending is converted to external spending.

Service and software markets have reached a critical mass: the worldwide market for professional services was $67 billion in 1991, another $49 billion was spent on software. Worldwide services markets are expected to grow at almost 12% annually through 1995, and revenue derived from software will grow even higher, almost 15% annually.

Together these forces conspire to create a segment of the IT industry with seemingly unlimited potential. As a result, systems integration, network integration and professional services are eyed enviously by hardware manufacturers whose other revenue streams are showing slow growth or declines.

Today EDS continues to display a remarkable ability to exploit the opportunity of services markets. During 1991, its best year ever, the company grew revenue by 16% and net income by 13%. For the first time since its takeover by GM in 1984, revenue derived from outside its parent accounted for more than half of the company's total.

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IDC INTERNATIONAL DATA CORPORATION
5 Speen Street, Framingham, MA 01701 / (508) 872-8200

EDS feels $25 billion in revenue is within its reach. With a decentralized, entrepreneurial organization, a highly segmented marketing plan, and an irrefutable history of successful implementations, EDS is well positioned to continue to grow. Other successful companies — Andersen Consulting, CA, CSC, IBM (software and services portions anyway) and Microsoft — are also poised for growth. None, however, appear to be reaping the benefits of so many major industry trends right now as EDS is doing.

Nonetheless, EDS faces a host of serious challenges. It remains a largely U.S.-only company; only 20% of 1991 revenue was derived outside the U.S., far below that of other companies. EDS must also balance its investments in HDS, ASK and MDSI with the need for product impartiality.

In addition, EDS must learn to avoid the conflict-of-interest problems associated with pitching multiple clients in similar businesses. The company must somehow maintain relations with the very MIS staff it often seeks to replace. Finally, and perhaps most challenging of all, EDS may soon have to take a leadership position in determining market standards and behaviors.

Any one of these challenges is great enough to slow EDS. Together, they represent a formidable barrier. In the following pages we examine how and why EDS may be able to scale it.

Today's Services Markets

How big is the worldwide system integration, professional services, and system management market?

For purposes of measuring IT suppliers' performance, IDC places the worldwide IT market at roughly $325 billion in 1991. That figure is composed of a wide range of hardware and software, distribution and services revenue derived by an even broader range of suppliers.

But, admittedly, that figure is not a true representation of all of the money IT users spend on their systems. It is an estimate of what IT users spend externally on IT, but it does not include such huge expenses as internal staffing, training, operations, maintenance, and IS planning. In addition, it does not include a whole range of telecommunications services, which are integral to the IT system and are also potential candidates for substitution, replacement or augmentation by competitive alternatives. And neither figures include difficult-to-measure numbers such as the overhead associated with large internal staffs and internal IS operations. As a result, the actual size of the worldwide IT industry is probably nearly twice IDC's $325 billion figure.

Counting the external services portions of the worldwide IT industry is particularly difficult. IDC estimates worldwide systems integration revenue to have been $22.9 billion in 1991. Worldwide professional services revenue was $67.3 billion.

How fast are the services segments growing? Faster than other segments of the IT industry:

Systems integration, defined by IDC as a set of client-vendor relationships in which the system integrator vendor provides a comprehensive IT solution, is expected to grow by 20% annually through 1996.

Professional services, defined by IDC as the actual discrete IT services regardless of the type of client-vendor relationship, are expected to grow by 16% annually for the same period. The next fastest growing segment of the worldwide IT market, software, is also expanding by approximately 16% annually.

EDS's Target Market

EDS takes an understandably rosy view of the size of its potential market. The company has targeted the billions of dollars spent internally by IT users in addition to the $325 billion in external spending.

The net result (according to EDS) is huge growth for two reasons. Even if the IT industry manages only single-digit growth, services will grow faster, probably in the 13% range annually, according to IDC.

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The Change Tool: EDS's Value Proposition

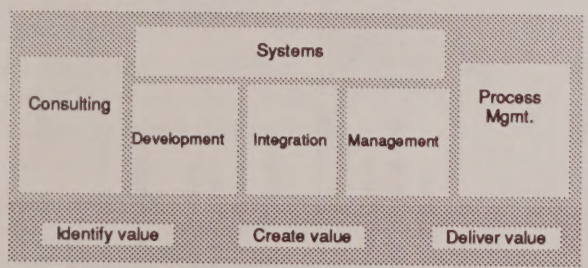
EDS has successfully leveraged its history of managing complex technologies and installations/integrations into a whole new line of business: a business process consulting practice. At the core of the development of upstream consulting business is EDS's "value proposition," a tool for identifying and measuring the benefits of changing business practices, usually (but not always) by employing information technology.

From the consulting group alone, EDS has completed approximately 70 value propositions, for 45 different customers. These contracts range in value from $50,000 to $750,000 and generally require 60 to 90 days for completion.

The value proposition is also used in virtually every prospect and customer proposal generated by individual strategic business units (SBUs). These proposals rely on the value proposition to identify and measure potential improvements in customers' operations, and are a vital component of EDS's sales strategy.

Measuring EDS's value to customers is increasingly important to EDS. The company is gradually moving away from fixed-price contracts toward contracts in which EDS is compensated based on the performance and savings of the systems it installs. At present, still, these represent a small portion of EDS's' overall business, but they are growing.

EDS's Value Proposition Model



Source: EDS, 1992

Following are some key components of the value proposition:

Value Proposition Identification

- Examine customers' business directions and determine how technology is aiding or abetting them
- Build a business plan
- Identify measurable "critical success factors"
- Build goals with customer management and key customer personnel; change plan belongs to customers

Business Operations

- To evaluate change plan, map structures in place: business enterprise model, function process model
- How effective is the current structure?
- Are fundamental changes required?

Information Technology

- Build architecture baseline: map IT to business process, allocate processes, evaluate across businesses, and across similar businesses in similar industries
- Investment management: bottom-up approach to determining costs and benefits of project
- Application valuation: measure what is working, what isn't
- Formulate new technology structure with resources from all over EDS

Integrated Programs for Change

- Create top-down plan: goals, critical success factors, implications and measurable components
- Measure benefits and feedback

EDS involves customer personnel in the entire value proposition process. Rather than a strict top-down, or bottom-up strategy, EDS builds consensus by demonstrating potential benefits to all layers of customers' personnel.

Source: IDC, 1992

However, importantly, that's just the beginning. As companies shift the allocation of their IS money from internal resources to external suppliers, the market will appear to grow even more. If services grow only by 13% annually, the internal to external shift will create the illusion that the market is actually growing faster, perhaps as much as 20% annually. In fact, it's not really growing ... just shifting.

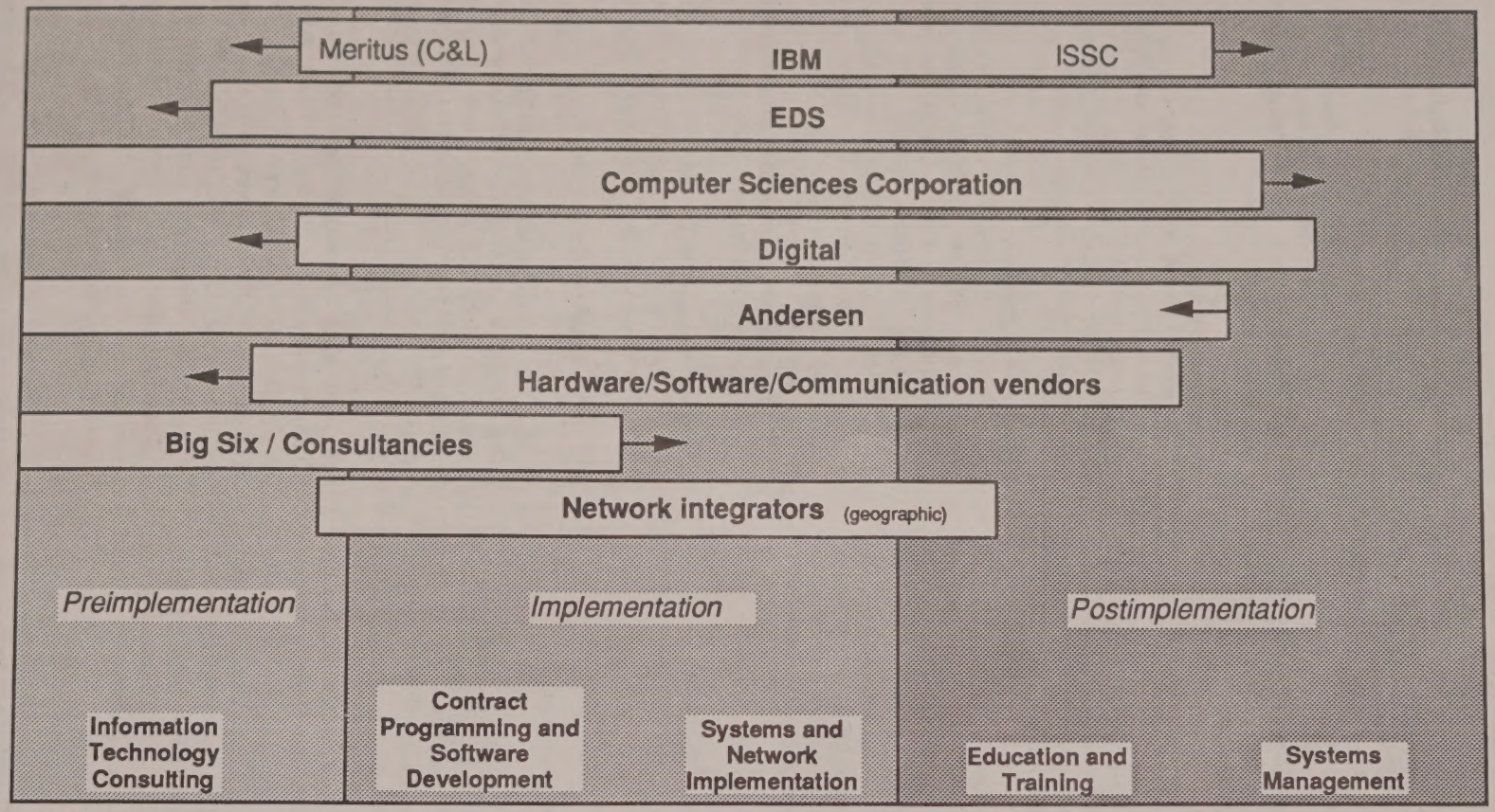
EDS as Change Manager

Since the GM takeover in 1984, EDS has undergone significant change. Its first challenge was to assimilate all of GM's computer and telecommunications activities. Its second challenge has been to redefine itself as a GM subsidiary and to communicate the change in its relations with customers, as well as with the industry at large. This has been completed, as evidenced by significant recent contracts with the U.S. Air Force and GE. The company has successfully managed to swallow one huge chunk of business, and is now eagerly stalking more.

EDS's goal is to become the "absolute best at managing technology risk." EDS defines that to mean providing a full range of services, coordinated by

(continued p. 5)

Services Diversification, 1991



Planning
- Requirements analysis
  - security audit
  - resource audit
  - work flow analysis
- IT strategy analysis
  - migration planning
  - architecture development
- Business process redesign

Design
- Systems design

- Contract programming
- Custom software design and development
  - documentation
  - testing
- Software customization
- Software reengineering
- Translation

- Site preparation
- Cabling
- System installation
- System migration activities
- Subsystem integration
- Testing

- Analyst/Programmer training
- Computer operations training
- Management training
- End user training

- Internal staff assistance
- Internal systems operations mgmt.
- External systems operations mgmt.

Processing Services
- Payroll
- Transaction processing services
- Timesharing
- Batch processing

Source: IDC, 1992

centrally controlled communications, with core and applications software expertise. The company's industry-customer knowledge is central to making technology come alive for EDS's customers.

How EDS Does It: Organization

Customers are the basic element of EDS's profit centers. EDS is organized around its customers in strategic business units (SBU) that focus on specific vertical markets: transportation, manufacturing, and energy/chemical among others. SBU managers negotiate with company management for development resources through a "leadership council" — a group of executives with oversight responsibility for EDS.

By organizing the company in vertical groups, EDS feels it is best able to focus on understanding its customers' businesses and IT needs. In addition to a better understanding of what customers want, the vertical groups create a degree of synergy. Successful installations of technology in a vertical market application — ranging on the small side from portions of code to, on the larger side, network configurations, can create scale efficiencies. If it worked once, it might work again in a similar application. And, if it does, EDS can save money and still deliver custom solutions.

EDS's competitors, on the other hand, are still organized in ways that do not place emphasis on individual customers. IBM, for all it has revolutionized and modernized its structure, is still organized around products. Andersen Consulting is organized around its branch offices. In each case, customers are not the strategic and tactical focus of decision making because the structures divert attention elsewhere.

Other SBUs manage technical resources and services across specific geographies. Unless otherwise directed, these SBUs are free to determine the best hardware solution for specific problems. Typically, EDS will build solutions from other EDS-developed applications and hardware/software configurations.

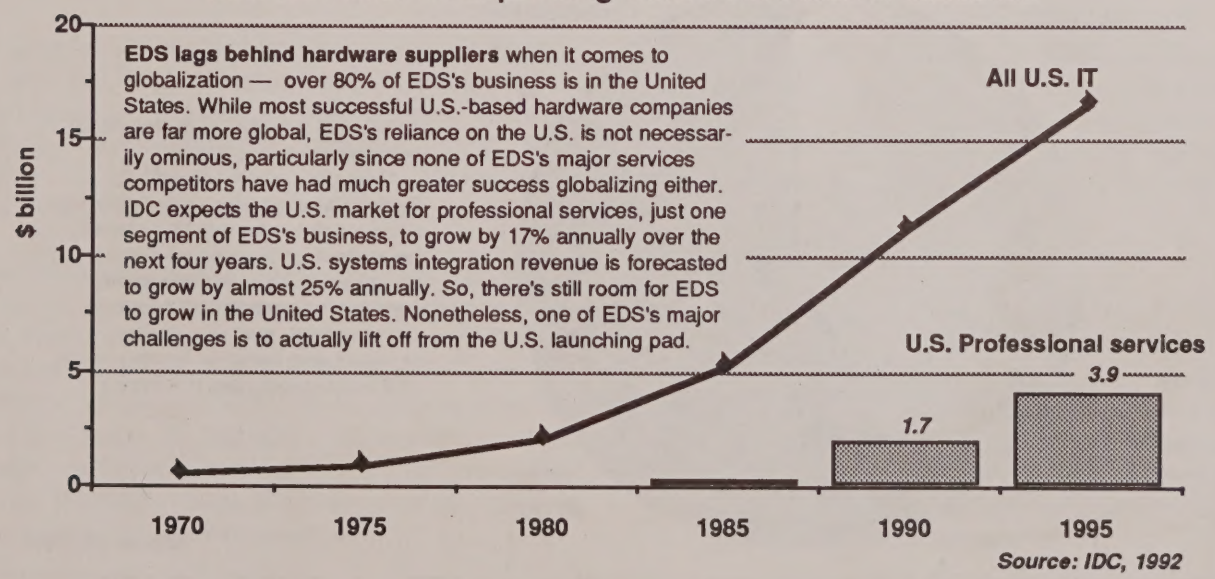
Selling: the "Value Proposition"

Selling at EDS used to mean telling customers what was wrong with them, then telling customers how and when EDS would change things. Carrying out the promise involved a blitzkrieg takeover of the customer's IS equipment and staff: the veritable bull in a china shop — nothing was spared.

Today EDS's sales message is built around a method for selling solutions, the "value proposition." EDS has effectively broadened its product line from its core strengths at the back end running customers' data centers. EDS now boasts a full range of consulting services that focus on customers' business processes, and provides a blueprint for managing the change to newer, more efficient business processes.

While such front-end business services constitute a small portion of EDS's overall revenue, it as a component that is of increasing strategic importance to EDS. By allying with customers at the front end, EDS has found that it can provide a much more useful service to the customer than simply reducing IS expenses.

U.S. Services: An Expanding Base from which to Globalize



Source: IDC, 1992

As a result of the "value proposition," EDS indicates it is able to provide better solutions less expensively. It points to customers' specific improvements in manufacturing quality, time-to-market, client-service-representative response time, among other quantum improvements.

EDS's Challenge: Become Truly Global

Despite EDS's notable success and bright future, the company has several serious challenges ahead.

For all its global posturing, EDS is behind many companies in the industry when it comes to globalization and global presence. In 1990, 18% of the company's revenue was derived from operations outside the United States; in 1991, 20% was. By contrast, the United States only constitutes approximately 35% of the total worldwide IT market, and 34% of worldwide services markets.

Whether this heavy dependence on the U.S. should be viewed as opportunity or liability remains to be seen. The judgment depends upon EDS's ability to execute strategy on a global basis.

Several scenarios might explain why EDS has yet to become a global company. One involves the difficulty overcoming standards and language barriers across many cultures — particularly difficult when selling systems integration and outsourcing. However, EDS international employees are predominantly native.

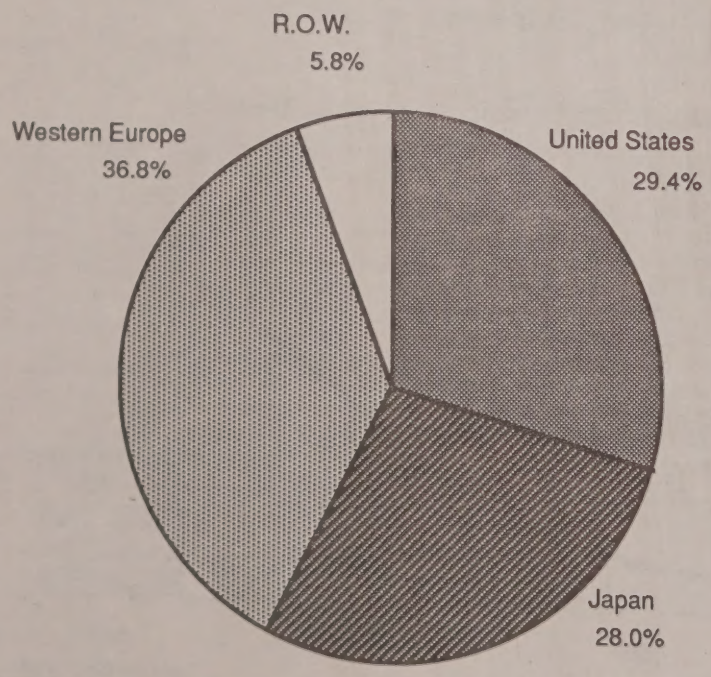
Another explanation involves differences between how geographic regions rely on mainframes, and how they are actively downsizing. For example, in the United States downsizing is occurring and has occurred rapidly, forcefully and, in some cases, frantically. That is not true in Japan, where mainframes comprise 13% of total IT spending (compared to 8% in the U.S.). EDS may have been capitalizing on the movement away from mainframe-centric information systems in the U.S. to infiltrate the weakening glass house. That opportunity has not yet presented itself to EDS in Japan.

Challenge: Balance Technology Investments

Over the past three years EDS has embarked on a fairly aggressive acquisitions campaign. It has acquired (or acquired parts of) Hitachi Data Systems, ASK, and MDSI. Most recently it has acquired Japan Systems.

The acquisitions raise a potential problem: the questioning of EDS's objectivity. EDS's customers trust EDS to provide objective recommendations. Should any of the acquisitions begin to falter, EDS may feel the need to bail them out by recommending their products to EDS's customers.

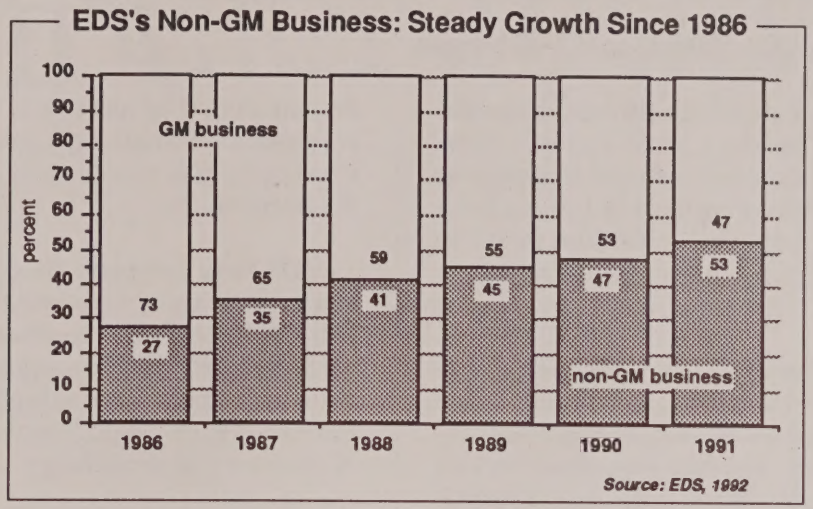
1991 Worldwide Professional Services Revenue by Region



Total 1991 worldwide professional services revenue: $67.3B

Professional services are defined by IDC as actual discrete IT services, regardless of the type of client-vendor relationship. They include such services as system and software development, systems design, systems and facilities management, and installation, and IT training.

Source: IDC, 1992



The issue gets stickier when it's considered in light of GM's current financial troubles. Should GM continue to feel severe financial strain, will it look to EDS for capital? Could financial pressure from GM management become so great that EDS might be pressured to buy home-made hardware and software, rather than be allowed to seek the best the industry has to offer? Might (a pessimist could ask) EDS be prevented from buying IBM ES/9000s, instructed instead to patronize HDS? What could spur such an event: another five-point drop in GM's market share and another $7 billion loss? How low must it go?

Challenge: Avoid Conflict of Interest

As EDS generates more and more revenue from front-end types of business consulting (the value proposition) its business model may change. Although these services will ultimately tie into EDS's core lines of business, EDS — and its customers — may need to reexamine their expectations of the service provider-client relationship.

Consider a major public accounting or corporate law firm. Once it acquires a client in a specific industry, it generally closes its doors to other potential clients in the same business. It doesn't, after all, want to project even the slightest image that a conflict of interest between the two clients might arise.

An IS supplier like EDS manages information that its customers use to drive great competitive advantage. The possibility that a direct competitor might somehow gain access to such information might be enough to cause potential EDS customers to reconsider. EDS may find its customers demanding vertical industry exclusivity in order to eliminate the potential loss of sensitive data. Or, customers may request some guarantee of noncompetition.

For years EDS has staked the company's reputation on its ability to insure the integrity of its management of customer data and records. While that may become a more difficult task in the future, EDS builds on a very strong record.

Challenge: Maintain Relations with MIS

Another difficult area for EDS will be the process of changing its image with MIS shops. EDS discarded its austere, demanding demeanor years ago (despite the warnings of its competitors). Nonetheless, some potential problems remain.

As EDS employs the "value proposition," it will enter more symbiotic relationships with MIS staff and management. Still, the by-product of a significant portion of EDS's business can be lost jobs — MIS jobs at customers' sites. If so, building working relations may be difficult. To date however, EDS maintains, almost every MIS staffperson at customers' sites has been offered a position within EDS.

At its worst, these types of problems may threaten to dilute the ultimate efficacy of the solutions that EDS implements. If EDS is sabotaged by unwilling customer MIS staff pining for their former mates, EDS may find itself unable to deliver on its promises.

In Summary

Despite these potential problem areas, EDS is well positioned for future growth. Its greatest resource, personnel, is as capable as any in the industry. Its segmentation and understanding of its customers is thorough. It has a strong technological infrastructure and yet is unencumbered by older technology. We anticipate continued growth from EDS as it continues to exploit industry dis-integration.

EDS Still Faces Significant Challenges

EDS has emerged as one of the healthiest companies in the worldwide IT industry, almost quietly. Revenue and profits are climbing steadily. It is gaining market share of an expanding market. It has a presence overseas, but geographic expansion seems to suggest even greater opportunity. All indicators are pointing in the right direction.

How has EDS done it? At first glance, it appears that tight management and careful planning are the reasons for the company's success. EDS is well managed. But so are plenty of other companies ... service companies as well as hardware and software suppliers. More significant forces are at work fueling EDS's rise.

In fact, EDS has squeezed its way into an exceptionally rare position. Nearly every major trend affecting the worldwide computer industry is working to EDS's benefit. Only the perception that EDS is still highly dependent upon mainframe technology seems to be working against it — a perception that EDS is rapidly changing by demonstrating expertise in managing PC, LAN and distributed-computing installations. As the worldwide market leader, EDS stands to benefit from the major trends more than its many competitors.

How rare is this scenario? Very. Many companies with household names have never enjoyed such an auspicious outlook. Only a few examples come to mind as having benefited from nearly every change surrounding them. In its heyday, GM and its forbears benefited from dirt-cheap gasoline prices, booming post-WWII consumer confidence, bulging discretionary income and massive federally funded highway programs. Likewise, William Paley's CBS rode the concurrent waves of technologic advances, advertisers' desires to reach national audiences and consumers' yawning leisure time to build the first broadcast television network.

EDS now finds itself in a similar position. The industry's major trends are pushing customers with billions of dollars worth of contracts into the company's hands.

Concomitant with the huge opportunity, however, comes challenge: the industry will accept only a limited period of such flux. Excess profits attract competition. Something's gotta give. EDS will need to do more than it's currently doing to stay ahead of the competition.

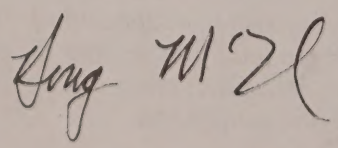
EDS faces a remarkable opportunity to bear the standard for a new chapter in the computer industry. Just as IBM defined the multiuser commercial processor, Apple defined the personal computer, and Lotus defined the personal productivity application, EDS too stands at the edge. At stake is the very definition of the future of the industry.

What kinds of things are we talking about? EDS has a remarkable opportunity to help define and promote technical standards; to outline customers' expectations; to articulate just what "open systems," "downsizing," and "client/server" really mean to customers; and to blueprint the nature of future relationships between computer services providers and customers.

This is hardly an easy assignment. Planting a stake in the ground — an innovative stake in rapidly changing terrain — requires great leadership. EDS management has displayed outstanding ability to lead and nurture a very capable organization. And few would question the company's technical proficiency.

But leading a company and defining an industry are vastly different challenges. The former demands a detail orientation and single-minded focus. The latter, broad-minded overview, charisma, and vision. Should the company accept the challenge, we may witness the unfolding of a huge industrial megaforce. If the challenge proves too great for the company, EDS will "only" continue to outgrow the computer industry.

Of perhaps greatest interest will be the implications for the rest of the industry, particularly suppliers of technology. How the upstream companies such as HP, IBM, Intel, Microsoft, Sun and Tandem respond may indicate the breadth of EDS's influence: will the tail (a dominant solutions integrator) wag the dogs (technology providers)?



THE GRAY SHEET
Computer Industry
REPORT

DONALD BELLOMY, GUEST EDITOR MARCH 27, 1992 • VOL. 27, NO.s 11-12 Published continuously since 1964.

U.S. IT Vertical Market Trendlines, 1992

With all the bizarre coinages (picocomputers, palmtops, parallel processors) and acronyms (OOP, RAID, GUI), industry people often forget that the comparatively bland "vertical market" is also somewhat peculiar to the IT universe of discourse.

Those unaware that we mean by it marketing to specific industries would get no help from the dictionary, which doesn't recognize the term. While some other industries (advertising and business services, for example) recognize "verticals," the term is rarely used with the specificity it is in the IT realm. The closest Webster's Unabridged gets is "situated at the highest point, directly overhead," which hints at the emotional resonance of the phrase to IT vendors looking for growth opportunities.

The industries in which computer suppliers' customers participate continues to be a primary focus for vendors, and therefore for IDC's research schedule. In the fourth quarter of 1991 IDC conducted some 1,600 interviews with IS executives at U.S. multiuser system sites and examined the results according to vertical markets. Among the most interesting findings where vertical market orientation had significant impact on responses were these:

- Despite the recession, over half of the survey base registered some degree of forward momentum in their central and end-user IS spending in 1991. The best showing was in health services, where 70% saw an increase in their budgets. The worst was in retail, with 41%. An average of 16% saw spending decrease. Health services saw the least damage, with only 6% reporting a downtick. In insurance/other financial, miscellaneous services, retail, and other, however, at least a fifth reported lower spending.

- Survey respondents anticipate 5% growth in IT budgets for 1992. Miscellaneous services is notably optimistic for the new year, with both insurance/other financial and health services also above the overall average. Nondurable manufacturing and retail expect spending to be flat to slightly down, while the other markets cluster closely around the 5% mean.

- Over a fifth of the survey base (22%) said that it had moved or was moving to client/server computing. Transportation/communications/utilities was the most committed, with 34% signing off on this option. Meanwhile 12% were planning a move, again led by transportation/communications utilities, at 22%. Another 15% would like to move, but are unsure how.

- The survey base split almost exactly in half when asked whether they were pursuing an open systems strategy. Most vertical markets did not stray too far from the mean in their responses with the exception of banking and wholesale, where 63% stated that they were not pursuing an open systems strategy.

- The highest interest level in systems integration was registered by retail, where 37% checked one or the other positive responses (currently using systems integrators or by

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IDC INTERNATIONAL DATA CORPORATION
5 Speen Street, Framingham, MA 01701 / (508) 872-8200

considering using them). Among respondents currently using systems integrators, the highest rankings fell to banking and retail, at 21% and 20%, respectively. However, it is important to note that no vertical market fell below double digits.

- An average of 44% of PCs were connected to LANs at yearend 1991, ranging from around a quarter in retail and banking to over half in business services, miscellaneous services, transportation/communications/utilities, wholesale, and other. Respondents expect this penetration of LANs to accelerate, with an average of 60% of PCs attached to LANs by yearend 1992. The projected ratio approaches 75% in three markets (business services, miscellaneous services, and wholesale), while only in the case of retail would the 1992 proportion not exceed the overall 1991 survey average.

- The 44% of the survey base with LANs show a marked preference for Novell, with 51% of the relevant respondents supporting Netware. The vertical variation runs from 39% of the LANed wholesale base to 72% of health services. Around a fifth (including some possible double-counting) support either Microsoft LAN Manager or IBM's LAN Server, rising to almost 30% in banking. Banyan Vines attracts 3% of the survey base with LANs.

IDC's most comprehensive analysis of U.S. IS vertical markets is presented in the multiclient report *U.S. IT Customer Directions and Spending Strategies — Vertical Market Usage and Plans* (IDC #6335). The survey highlighted key issues, trends, and spending patterns in the following vertical market groupings:

- Banking
- Insurance and Other Financial
- Industrial Equipment Manufacturing
- Other Durable Manufacturing
- Nondurable Manufacturing
- Health Services
- Business Services
- Miscellaneous Services
- Transportation/Communications/Utilities
- Retail
- Wholesale
- Other

For particular industries (two-digit SIC codes) within each IDC grouping, see the table appearing on page 10.

Detailed results from two vertical segments, banking and health care are presented in this issue of the *Gray Sheet*. These data are only the beginning of the complete analysis of the activity within each vertical segment. Nonetheless, they still offer remarkable insight into each segment.

An even-more-general synopsis of results in each of the remaining vertical markets is summarized beginning on page six.

Focus: IT in Banking

Historically one of the bedrocks of IS investment, the banking community has been beset with a numbing series of changes over the past couple of years. Major players in the economic expansion of the 1980s, banks are among the most visible victims of the lowered expectations of the 1990s. The recession has increased the number of bad loans and decreased the worth of real estate security. Banks have reacted by consolidation and belt tightening, both of which have had an effect on IS investment.

The economic climate is only one factor, however, in the high number of instances in which banking scores very high or very low on various questions. The long-standing conservatism of the banking sector shows in its attitudes towards some new trends, including Unix, while other new developments will clearly be embraced as soon as the budget pressure eases.

- The banking sector in the survey base saw budgets drop 10% on average in 1991, and expects only average growth in 1992. With

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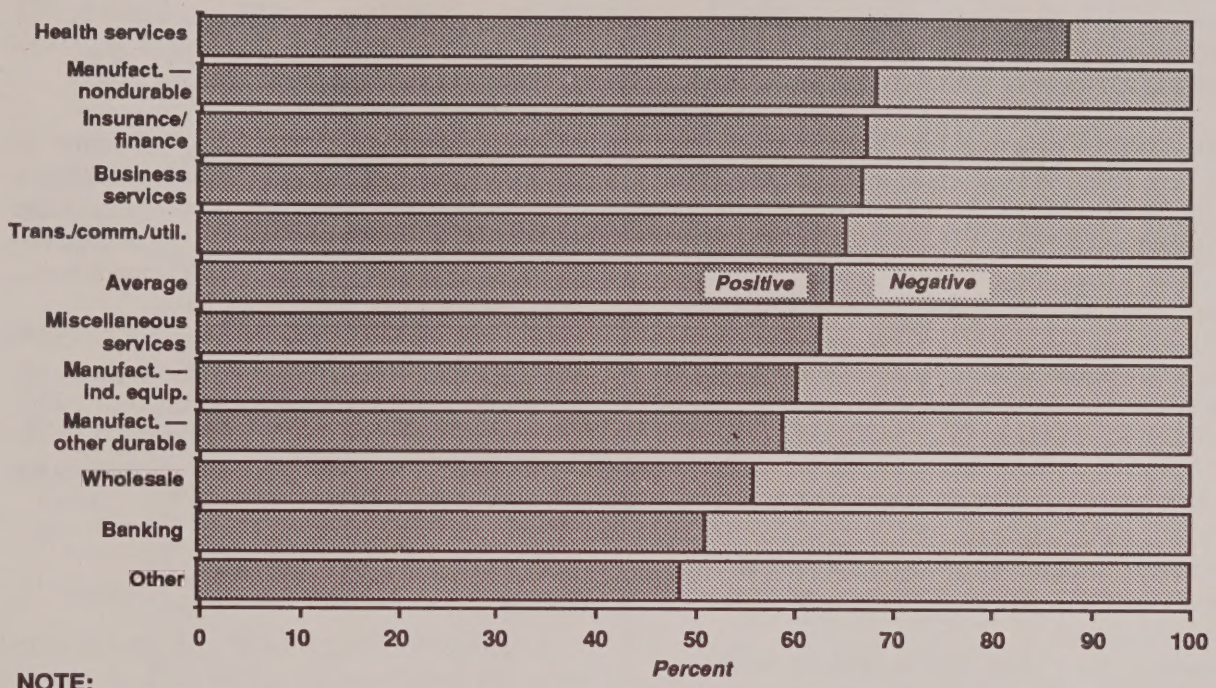
Positive and Negative U.S. IS Spending Attitudes by Vertical Market, 4Q1991 Survey



NOTE:
Positive attitudes are a total of the percentages responding to the choices "Our needs are growing rapidly, we continue to invest heavily in hardware, software, and services"; "We have about enough hardware horsepower, we now are investing mostly in software and services"; or "Most of our software is in place, but we need to increase our hardware capacities."
Negative attitudes are a total of the percentages responding to the choices "Our IS environment is basically stable and we don't anticipate major growth in hardware, software or services" or "Our IS environment is contracting. Spending will be flat to down in subsequent years."

Source: IDC, 1992

average site budgets in excess of $4 million, the highest in the survey group, the downturn for banking has affected the entire IT market.

- Banking had the highest negative rating in its attitude towards IS spending; almost half checked choices indicating stable spending with no major growth in any area, or a contraction of spending.

- Controlling costs is a critical imperative for nearly two-thirds of the banking community, by far the highest ratio for any of the sectors surveyed.

- Outsourcing has a particular appeal to banking IS shops, with 30% actively pursuing or considering it as an option.

- Migration from older systems to more modern hardware and/or software platforms is a lower priority for banking than for any other group in the survey base.

- IS managers in banking view themselves as incrementalists, making regular if often small improvements to existing systems.

- Banking nevertheless scores relatively high in the degree of penetration anticipated in 1992 for 11 new types of products and services. Among new technologies, banking shows relatively strong interest in image processing and multimedia.

- Banking had the lowest proportion in the survey base expecting to downsize existing applications, but even so over 10% expect to move major applications off central computers onto smaller, distributed systems.

- Banking had a relatively low proportion of respondents (21%) pursuing or considering a Unix-oriented strategy.

- In 1991 MS-Windows had been installed on 26% of PCs in the banking sector, a proportion very close to the survey average; however, by yearend 1992 this ratio is expected to increase to a survey-leading 60%.

- A much higher proportion (62%) of the banking base than average states that it still has many terminals to replace with PCs and workstations.

- The replacements will presumably be largely PCs, since banking had the lowest percentage (18%) agreeing that Unix workstations are becoming a viable alternative to traditional personal computers.

- In 1991 over half the PCs purchased in the banking sector came direct from the manufacturer, compared to only a quarter in the survey base as a whole.

- A survey-low 29% of PCs in banking were connected to a host computer, compared to an average of two-thirds.

- A low 27% of PCs in banking were on a local area network at yearend 1991, compared to 44% overall. Strong LAN penetration in 1992 should increase the ratio to 47%, still well below the average of 60%.

- Banking is a relatively high consumer of packaged applications, with 50% of software spending going for packages (compared to 30% overall) and the rest for internally developed applications and outside contractors.

- Overwhelmingly the major activity of software staff at banking sites is systems or network maintenance, which accounted for 60% of staff time compared to an average of 33%. Only 16% of staff time went to developing new applications.

Focus: IT in Health Services

The health of the U.S. health industry depends on who you are. If you are a consumer and/or voter, there is a growing perception of crisis. If you are a

Why Study Vertical Markets?

The acceleration of vendor interest in the vertical markets in which their customers operate is a function of a series of critical transitions in the information industry:

- Low-growth ceilings. With secular and cyclical forces conspiring to cut industry growth rates to near-invisibility, understanding the customer's needs and wants moves from bromide status to a make-or-break dimension. As a matter of simple survival, vendors need to pay closer attention than ever before to exactly what users do, need, and want (or can be persuaded to want).

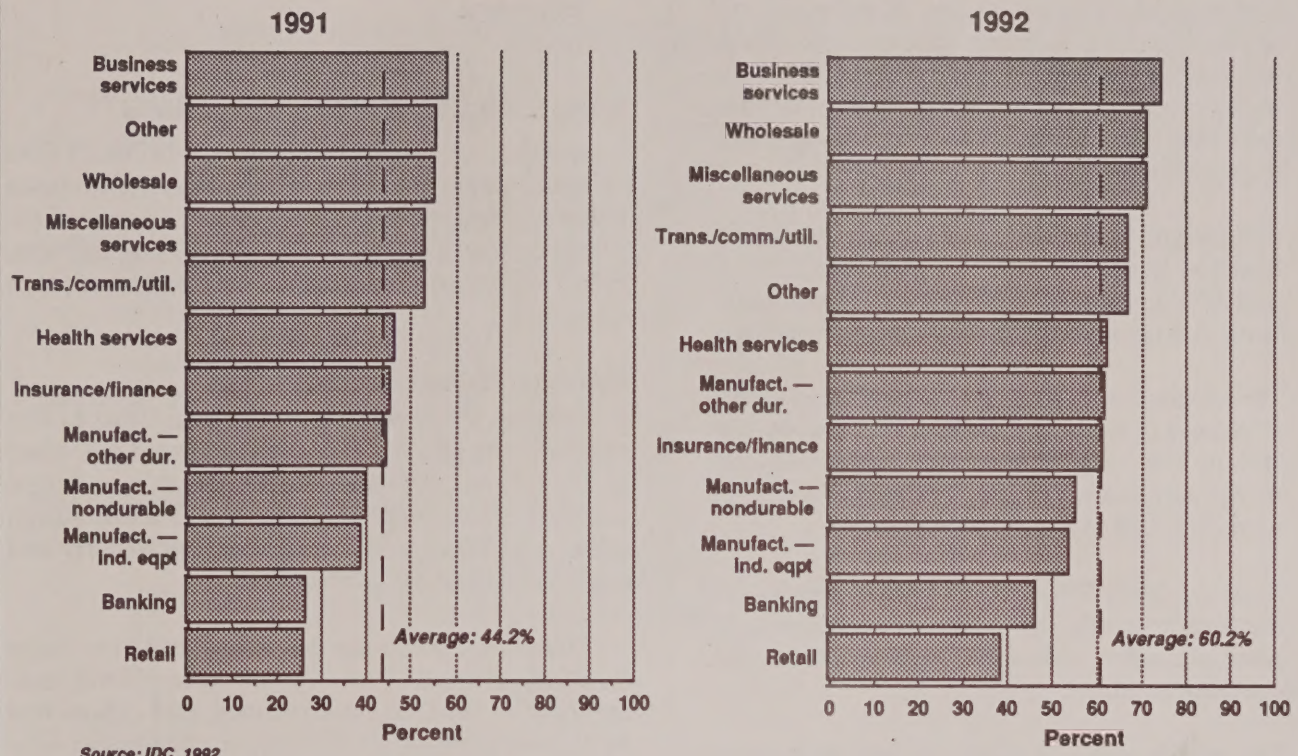
- User strategic decisions. IDC has long assumed, with new levels of empirical evidence from the U.S. IT Customer Directions and Spending Strategies project, that the two most significant factors in users' decisions about what and why to buy are the hardware and software environments that they have installed and the industries in which they compete. For some questions the host environment is more important, in others the vertical market.

- The shift to software and services. The only areas of the U.S. IT industry to register double-digit growth in 1991 were application tools and solutions and professional services. In each case success typically depends on tailoring offerings to particular types of user environments, which often means vertical markets.

- The potential of the small business market. Still comparatively underautomated despite a decade of efforts to open it up, the small business market has become a prime target in a period of otherwise low growth. While it is still unclear whether current activity will be much more effective, the key to small business sales is almost invariably the right combination of application software programs.

- The necessity to focus development and sales efforts. Vendors suffering revenue stasis and profit declines can no longer afford the luxury of being all things to all users, and must concentrate on particular markets where they have had success in the past.

Percent of PCs on LANs in 1991 and 1992 by Vertical Market



health professional, you are likely to be unhappy but making money. If you are an IS manager in the health sector or a vendor supplying it, you are happy and the envy of your peers.

- Health services was the only industry grouping in the survey to register double-digit growth in 1991. Although it does not expect to repeat this in 1992, growth should continue to outpace the industry average.

- A survey-high 70% (compared to 52% overall) of health increased IS spending in 1991, and a survey-low 6% (compared to an average of 16%) decreased spending.

- A survey-high 64% of the health services base expect spending to increase in 1992 over 1991, compared to an average of 47%, while a relatively low 11% (compared to 15% overall) anticipate a decrease.

- Health services had the highest proportions of any vertical market groups in the survey agreeing that their needs were growing rapidly and that they would continue to invest heavily in hardware, software, and services (35%, compared to a 26% average); stating that while they had enough hardware horsepower, they were now investing mostly in software and services (31% compared to 24%); and noting that, while most of their software was in place, they were increasing their hardware capacities (21% compared to 15%).

- Conversely, health had by far the lowest proportion stating that their IS environment was basically stable with no major growth anticipated in hardware, software, or services (8% compared to 27% overall), and a survey-low 5% (compared to 9% overall) stating that their IS environment was contracting.

- A survey-high 58% of the health services base (compared to 43% overall) agreed that their organization still needs many more PCs and workstations and that they will buy them as fast as they can afford to.

- Its stance towards IS change is experimental without being "bleeding edge"; a survey-high 41% (compared to 29% overall) agreed with the statement "We experiment with new technologies but generally maintain a 'let others prove it' attitude."

- Health scored above average in the penetration of new products and services. Besides EDI and workstations, image processing is a major drawing card for 1992 spending. It had comparatively high acceptance rates for several product types, including disk arrays (RAID technology) and multiprotocol routers.

- The prognosis for Unix among IS managers in health is in general not very good, with a very high 80% (compared to 63% overall) neither pursuing nor considering a Unix-oriented strategy.

- The proportion of IBM-compatible PCs with MS-Windows in the health sector was a survey-low 16% in 1991, and is expected to improve only marginally in 1992 to 28%. The survey averages were 25% and 44%, respectively.

- A survey-high 52% of 1991 software spending in the health survey base went for packaged software, and a survey-low 41% for internally developed applications.

- The health sector is relatively cool to training staff in CASE tools and methods or in object-oriented technologies over the next two years, with survey-low levels of importance assigned to the prospect. Training in network management and operating systems, on the other hand, is important.

Nine Remaining Vertical Markets

Analysis of the data within each of the 11 IDC vertical market segments produced an enormous volume of results. In order to present a comprehensive overview of the total market by vertical segment, following is a brief rundown of the results from each category.

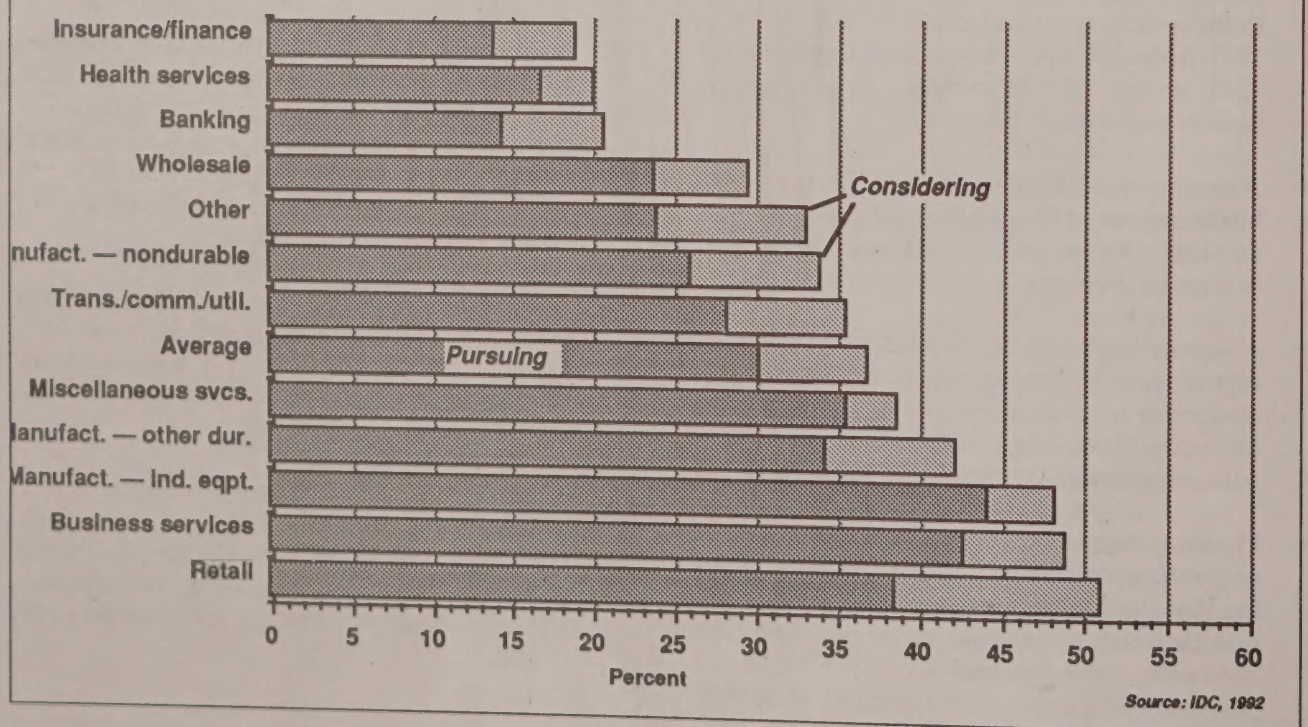
Insurance/Other Financial

Some of the specific industries included in this category were hard hit by the recession (real estate and nondepository credit institutions), some were relatively if not completely insulated (life insurance), while others had a roller coaster ride (security and commodity brokers and dealers).

To further complicate generalizations, it includes both industries still known for their exceptional commitment to IBM and mainframes, and others that have been increasingly focused on distributed computing on workstations.

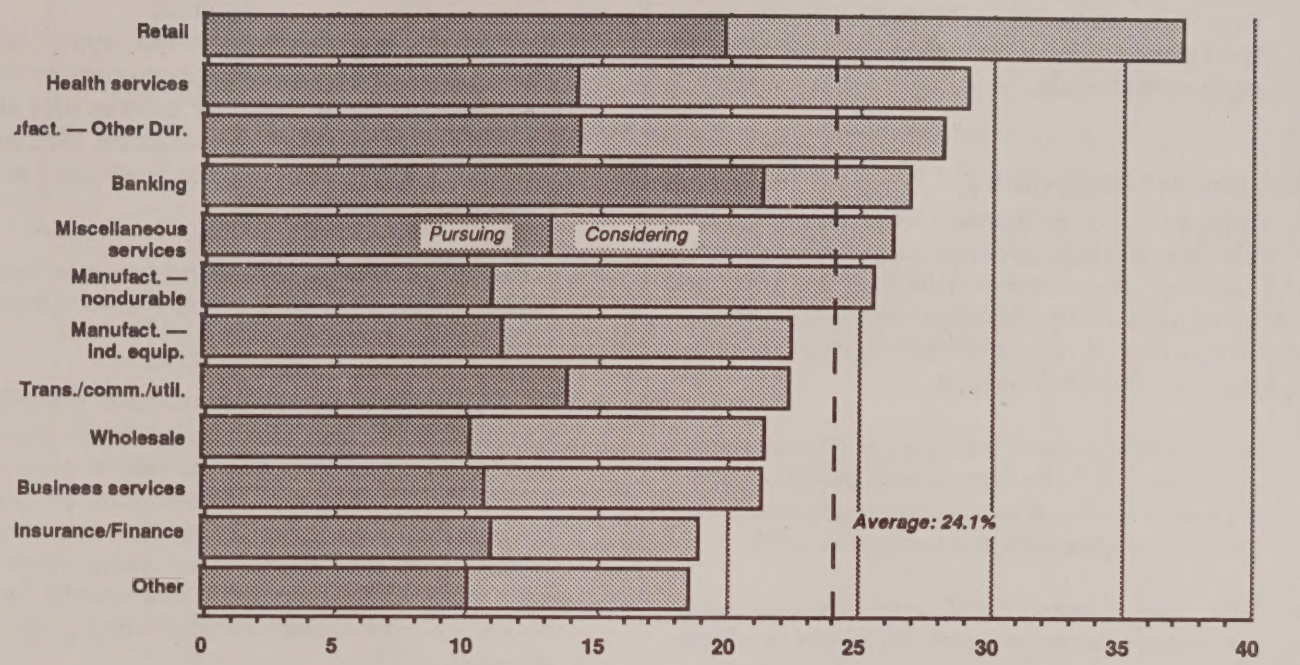
- Overall, the insurance/other financial sector was an average performer in 1991, although it expects to do somewhat better in 1992. This

Proportions of U.S. Sites Pursuing or Considering a Unix-Oriented Strategy by Vertical Market



Source: IDC, 1992

Proportions of U.S. Users Using or Considering Using a Systems Integrator by Vertical Market



Source: IDC, 1992

is significant because the average site budget is the second highest in the survey base, at around $3 million.

- Insurance/other financial had the highest proportion (14.0%, compared to an average of 8.5%) willing to buck the trend towards downsizing by moving applications prototyped on distributed systems onto larger, centralized host resources.

- Insurance/other financial reported the lowest percentage pursuing or considering a Unix-oriented strategy (20%), and is second only to banking in its disbelief in the proposition that Unix workstations are becoming a realistic option in place of PCs.

Industrial Equipment Manufacturing

The competitive pressures on U.S. manufacturing were exacerbated in 1991 by the performance of two components of the industrial equipment manufacturing group, the automotive and computer industries. However, the obsession with quality (read: foreign, typically Japanese competition) often leads to a countervailing plus for IS in this sector.

- As far as IS budgets are concerned, 1991 found industrial equipment manufacturing slightly below the average, and 1992 is expected to follow suit.

- Industrial equipment manufacturing registered the highest proportion (44%, compared to 30% overall) currently pursuing a Unix-oriented strategy.

- Industrial equipment manufacturing had, at 15.0% compared to an average of 6.5%, marginally the highest proportion of workstations in its mix of single-user systems (compared to IBM-compatible PCs, Macintoshes, etc.), while a comparatively high 18.0% expect to change the mix in favor of workstations.

- Industrial equipment manufacturing leads in the relative extent and degree of penetration of 11 new products and services. Workstations, EDI, and CASE have a particularly strong appeal.

Other Durable Manufacturing

The industries in this sector, including chemicals, plastics, and refining, were less affected by the recession, although the oil industry had its own problems in the first quarter of 1991.

- Budgets in other durable manufacturing did better than industrial equipment manufacturing in 1991, with the survey base indicating 7% growth last year. Unfortunately, the sector does not anticipate maintaining this above-average pace in 1992.

- A survey-high 47% (compared to 38% overall) of the other durable manufacturing base stated that they were essentially saturated with PCs and workstations and were now in an upgrade or replacement mode.

Nondurable Manufacturing

Although many industries in this sector, which includes food and tobacco processing, textiles, apparel, and furniture, have seen growth rates fall from the 1980s, they apparently did not have a sharp short-run downturn due to the recession. However, belt-tightening is also obvious here.

- Nondurable manufacturing reported a relatively exuberant 9% IS budget growth in 1991. Nonetheless, it is one of two industry groupings expecting budgets to be flat to down in 1992.

- EDI, workstations, CASE, and object-oriented technology are the most attractive new products and services for nondurable manufacturing.

- In the 44% of the nondurable manufacturing base pursuing an open systems strategy (somewhat below the average of 50%), a survey-high 59% are implementing it through a standardized operating system (the other choices were an enterprise-wide communications system and common development tools, languages, and database software). Nevertheless, the proportion pursuing a Unix-oriented strategy was below average.

Business Services

About all that some of the services in this sector share is classification within the 73 SIC code. Some are particularly exposed to economic hard times (advertising, consumer credit, employment agencies, etc.). Others are in relatively good shape, including participants in the two U.S. IT markets with double-digit growth, computer software and professional services. The presence of professional and processing services is important to bear in mind when evaluating some of the results.

- Business services was overall an average performer in 1991 IS budget growth, and expects to be the same in 1992.

- Business services styles itself leading edge in its attitude towards IS change, with a survey-high 38% (compared to a 26% average) stating that it often adopts new technologies with the expectation that they can dramatically improve IS productivity.

- Its relatively high ranking in the degree and extent of penetration of new products and services bears out this claim. Business services sites are particularly attracted to workstations, EDI, object-oriented databases and/or languages, and CD/ROM.

- A high proportion of the business services base (43%, compared to 30% overall) is pursuing a Unix-oriented strategy.

- The proportion of workstations compared to IBM-compatible PCs and Macintoshes in its single-user installed base is high for business services, at 14.5% compared to 6.5% overall. A higher proportion than average expect to move towards workstations over the next two years, while a survey-high 35% (compared to 26% overall) agree that Unix workstations are becoming a viable alternative to PCs.

Miscellaneous Services

When we turn to miscellaneous services such as personal, legal, or social services or the amusement industry, we largely leave behind the traditional image of the glass house. In fact, the average annual IS site budget in this sector, around $500,000, is the lowest in the survey base, about one-eighth the size of a typical site budget in banking.

Nonetheless, the reactions of IS managers in miscellaneous services do not differ from their peers elsewhere as much as might be expected. The relative paucity of extreme highs or lows in their responses suggests the degree of convergence between miscellaneous services and other sectors, including the effect of belt tightening.

- Miscellaneous services saw flat budgets in 1991.

- An average performer in acceptance of new technologies, miscellaneous services generally replicates the preferences of business services, with a somewhat better response to CD/ROM.

- When asked whether their organization needed many more PCs and workstations and would buy them as fast as they could afford to, miscellaneous services had a distinctly better response than average, with 50% agreeing in contrast to 435 overall.

Extent of Penetration of New Products and Technologies in Four Vertical Markets

Banking	Industrial Equipment Mftg
Image processing	Workstations
Multimedia	CASE
Object-oriented technology	EDI
EDI	Object-oriented technology
Workstations	Multiprotocol routers
AVERAGE	AVERAGE
CD/ROM	CD/ROM
CASE	Multimedia
RAID	Image processing
Expert systems	Expert systems
Multiprotocol routers	FDDI cabling
FDDI cabling	RAID
Business Services	**Retail**
Workstations	EDI
EDI	Multimedia
Object-oriented technology	Object-oriented technology
CD/ROM	Workstations
Image processing	CASE
Multiprotocol routers	AVERAGE
AVERAGE	Multiprotocol routers
CASE	Expert systems
Expert systems	CD/ROM
Multimedia	RAID
RAID	Image processing
FDDI cabling	FDDI cabling

*Computed by averaging the totals of "exploratory" and "significant" responses for the use of the eleven products and services cited in 1992.

SOURCE: International Data Corporation, 1992

- The only area where miscellaneous services strongly differed from other vertical market groupings was in the acquisition sources of PCs in 1991, with a much higher willingness to turn to department, mass merchant, or electronic stores.

Transportation/Communications/Utilities

This vertical market conglomerate includes communications, an industry group that has long been, and almost certainly will continue to be, a significant investor in IT, and transportation, a sector discovering that fast and effective collection and dissemination of information has become critical for competitive survival. The weak spot for IT currently seems to be utilities, where the recession was aggravated by the confusing transition to deregulation or reregulation.

- Average site budgets in the transportation/communications/utilities sector were in the $2 million range, third highest in the survey base.
- Overall budget growth in 1991 was better than average, but respondents did not expect to be able to keep up the pace in 1992.
- When asked what their primary focus would be in 1992, a survey-high 37% in this grouping (compared to 28% overall) cited the need to integrate central and end-user resources into a single enterprise information system.
- Transportation/communications/utilities scored above- average as an implementer of new products and services. An exceptional element was the high ranking given to CASE.
- The sector has a strong interest in client/server computing; a survey-high 64% displayed a positive attitude towards the approach, compared to 49% overall. Transportation/communications/utilities respondents also rate training staff in client/server applications development a more important task than their peers elsewhere.

Retail

During a recession retail is where the rubber meets the brick wall; no sector of the economy has been battered more mercilessly during the downturn in consumer confidence and purchasing power.

The IT industry has been less affected by the bad news in retail than it might have been, but for the worst of reasons: even in flush times retail in general has not been a particularly strong believer in computer-related products. Nevertheless, the sector is investing in some areas, particularly point-of-sale terminals.

- IS budgets among retail respondents did better on average in 1991, but are expected to be flat in 1992.
- A survey-high 30% of the retail base (compared to 15% overall) expect IS spending at their site to decrease in 1992. A high 14% described their IS environment as contracting, with spending flat to down for the next few years.
- A survey-high 43% of the retail base (compared to 33% overall) cited migration from older systems to more modern hardware and/or software platforms as the most critical area of focus in 1992.

Wholesale

Sites specializing in the distribution of goods are coming to recognize the importance of effective distribution of information. However, their emerging awareness is coming at a poor time for implementing it.

- Budgets in the wholesale base were flat to down in 1991, and are expected to be only average performers in 1992. It had a relatively low positive attitude towards spending of 56%, compared to the 64% survey average.
- Wholesale is a coldbed of technological change. The fifth of the sector stating that they rarely make more than marginal IS improvements was a survey high, while it ranked lowest in the extent and degree of penetration of new products and services.
- A low 34% of wholesale (compared to 49% overall) had a positive attitude towards client/server computing.
- A survey-low 37.0% of wholesale (compared to 49.5% overall) stated that it was pursuing an open systems strategy. The proportion pursuing or considering a Unix-oriented strategy was also below average.

Vertical Market Classifications

Classification	2-Digit SIC Codes
Banking	60
Insurance, Other Financial	61-67
Manufacturing: Industrial Equipment	35-37
Manufacturing: Other Durable	29-34, 38-39
Manufacturing: Nondurable	20-28
Health Services	80
Business Services	73
Miscellaneous Services	70-72, 75-79, 81, 83, 87, 89
Transportation/Communications/ Utilities	40-49
Retail	52-59
Wholesale	50-51
Other	01-17; 84-86; 88; 99

Not included in the survey base: Education (SIC Code 82) and Government (SIC Codes 91-93)

SOURCE: Standard Industrial Classification Manual, 1987 and International Data Corporation, 1992

- Wholesale was the most likely vertical market grouping to display no interest at all in outsourcing (90%, compared to 83% overall).

Additional research

Readers should be aware that the vertical market analysis presented here reflects only one view of today's U.S. IT marketplace. Previous IDC research examined the data from the 1,600 end-user surveys by another important factor: host environments. In addition, the survey data can be cut by customer budget size, number of site employees or other client-defined criteria.

IDC's Vertical Market Research — A Note on Methodology

The tables, figures, and discussions in this issue of the Gray Sheet have been excerpted from IDC's report *U.S. IT Customer Directions and Spending Strategies — Vertical Market Usage and Plans (IDC #6335)* — IDC's most comprehensive report on vertical markets.

The full report contains a wealth of information on vertical-market spending history and spending intentions. It examines how different vertical markets are basing their IS plans around gradual centralization or decentralization, Unix and open systems, distributed PCs, systems integrators, and many other categories. We have excerpted here only some of the highlights of the key findings for each industry grouping, particularly where a vertical market shows a major shift from the survey mean.

The report is based upon 1,600 in-depth end-user interviews conducted by IDC staff in late 1991. That survey provides a comprehensive view of demand-side expectations for 1992 in the United States. Similar survey work is currently being conducted in the U.K., France, Germany and Japan.

IDC intentionally placed limits on the survey design in order to achieve a manageable approach to spending research. These exclusions provide the ability to project data by host-specific environments, and have a limited impact on the industrywide inferences derivable from the resulting data. Among the boundaries established by IDC were the following:

- The research design included only sites with existing information systems. The rate of new site formation and, conversely, centralization and site divestment are minor and broadly countervailing elements in overall growth calculations and trend analysis.
- IDC focused on MIS management to obtain information.
- The survey effort was designed to exclude government and education sites in order to assure adequate samples of key commercial markets, which typically have different procurement policies and issues.
- PC-only sites and supercomputer sites (i.e., Cray and Convex) are not included in this analysis and will be reported on separately.
- Home spending for PCs or other consumer spending is not represented in this survey.

The resulting design represents the most comprehensive user spending effort ever undertaken by IDC. We believe that the overall industry perspective offered by this effort provides the most reliable source of information systems trends in the United States.

If further information is required, please contact your local IDC representative.

A Vertical Leap of Faith

Several questions have shaped IDC's analysis of our recent survey of end users in the United States: What are the best predictors of buyers' purchase intentions? How do they contribute? Will they continue to influence users' buying plans as the shapes of corporate computing themselves change?

Years of end-user research have shown that at least two traits are strong indicators of a respondent's buying intentions: the industry in which a respondent competes, and the senior system at that site.

The industry in which a company competes (its "vertical market" in industry parlance) is a strong indicator of two types of IT characteristics: the applications the site is likely running, and the overall mission of IS staff. In addition, the general feelings of well-being, as signified by buying intentions, map more closely to vertical market than any other single major indicator. In this survey, health services emerged as the most overtly optimistic vertical, while banking was the least optimistic.

The respondent's host environment is a better predictor of the type of specific tools and staffing needs of the sites. That data can be used to examine buying intentions within new technologies such as client/server and distributed computing. In general, the least enthusiasm for these new technologies comes from the IBM AS/400 and System 3X customers. IBM mainframe and Unix environments tend to be most aggressive in terms of their plans for the new computing schemes.

There are more than two ways to slice the data, however. A third dimension, the size of the respondent's business, provides even further insight into users' buying plans. But it also muddies the waters by introducing covariance dilemmas. Future IDC research may examine the role that site size plays in affecting buying plans.

In the coming months, a fourth major variable will be added to the puzzle. IDC will complete similar demand-side research in England, France, Germany and Japan. Then, IDC's view of the IT users' universe will be even more complete.

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THE GRAY SHEET
Computer Industry REPORT

DOUG McLEOD, EDITOR | APRIL 17, 1992 • VOL. 27, NO. 13 | Published continuously since 1964.

Digital Equipment Corporation's Divergent Paths

Like other systems companies, Digital Equipment Corporation is under the gun to adapt to the new competitive standards implied by computer industry dis-integration. Since the traditional vertically-integrated VAX hardware/software/services model will not generate much more growth, Digital must rapidly redefine its business practices. The company's considerable losses last quarter punctuate the severity of the challenge.

Digital's fortunes are tied to its ability to focus and execute on opportunities within two broad segments of the dis-integrated computer industry: supplying technology, and delivering solutions. Digital is competing, on one hand, to build and supply core technologies: microprocessors, semiconductors, disk drives, operating systems, workstations, multiuser open systems and PCs. It is also, on the other hand, competing to provide customer solutions: applications software, systems integration and professional services.

How well Digital succeeds in making the transition from its current morphology hinges on several key points:

- Alpha. By the end of 1992, Digital will unveil its first products based on the internally developed 64-bit RISC microprocessor dubbed Alpha. However, Digital's competence in cutthroat core-technology *commodity* markets has yet to be proven. Introducing a new microprocessor in commodity market is totally different than Digital's historic bread-and-butter *proprietary* markets. The key components of Digital's Alpha challenge will be to convince other systems vendors to design products around Alpha, in order to build market acceptance and share. Digital has never before approached the microprocessor business in this way. In fact, it has never approached microprocessors as a business before.

- OEMs. One important component of providing technologies is maintaining high unit volume since commodity margins are lower than proprietary margins. Direct sales channels necessarily limit market exposure, and usually limit sales volume. OEM channels are the answer. Digital practically invented systems OEMs years ago; strong VARs have been a big asset. Now it needs *other systems companies* to OEM its products, too.

- Middleware. Digital's expertise in systems software and networking ("middleware") has been the company's most significant asset in the recent past. The emergence of Novell as the dominant provider of LAN-centric networks poses a serious threat to Digital, and is partly responsible for the cozying relationship between Digital and Microsoft. Digital (great networking, poor ISV track record and poor desktop apps business) and Microsoft (dominant "small software" expertise, less-than-stellar networking and service) complement each other beautifully. How effectively Digital parlays the relationship into middleware products will go a long way toward determining its successful transition.

- Services. Digital has been as successful as any traditional systems company in selling services, which comprised over 40% of Digital's 1991 revenue. Annual services revenue growth is around 15%. The non-maintenance portion of services (which in-

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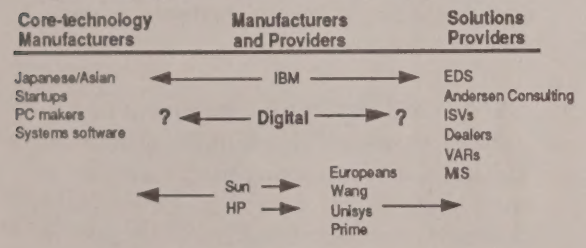
cludes education, consulting, SI, etc.) is growing almost 50% annually (although it is slightly smaller than maintenance). Digital needs to continue building momentum to keep pace with its significant competitors, Andersen, CSC, EDS, and IBM.

In many ways Digital is well positioned to be a world class manufacturer of core computing technologies. It is building from a very solid base of engineering skills. It maintains a positive brand image, and counts one of the largest bases of customers. Likewise, Digital has the necessary components to become a world class services provider.

Digital Equipment and Industry Dis-Integration



To make the change from general systems company to each of these new niches, however, Digital faces the challenge of completely rearranging its current business strategy.

Whereas its resources have been focused on connectivity and communication within the Digital product world, they will have to be focused on alliance and cooperation within the industry at large. Alpha needs not only to run NT, but it must be sold by a CompuAdd, or an Olivetti. Expanding channels to drive volumes to support the lower profit margins of commodity products is a critical component of the new strategy.

In addition, Digital's services need not only integrate Apple and Compaq into Digital server-based VMS and Ultrix networks, but into Tandem and IBM (among others) hardware and software. In short, Digital's support and integration services will need to be as objective and as multivendor as its competitors.

The basic challenge facing Digital is to leverage its core strengths in product engineering, networking and customer support into more significant assets in the new-order computer industry. In the following pages we examine Digital's ability to compete in core-technology markets, its ability to compete in services and integration markets, and the vexing problem of managing an installed base during industry metamorphosis.

Digital as a Microprocessor and Systems Manufacturing Company

Digital's reputation for rock-solid design and engineering capabilities has grown over almost three decades. Its track record at building and at getting those products to end users hasn't been quite as stellar. Remember the Rainbow, the MicroVAX 1 and the VAX 9000.

In recognition that its former development and sales model has been rendered less than effective, Digital is now building core technologies that will be sold to end users by a variety of means. Some will be sold exclusively by Digital. Some will be sold by traditional (for Digital) indirect means: VARs reselling workstations and systems. Others core technologies will be distributed through OEMs selling Alpha-based systems, a relatively new means of indirect distribution for Digital.

In the technology areas, Digital is focusing on three key core-technology businesses: microprocessors (Alpha), systems (PCs and VAXs), software (NAS), and peripherals (disk drives). We review Digital's Alpha and systems initiative here; storage products are examined on page five.

Microprocessors and Systems

Digital claims Alpha will provide a scalability ratio of 1,000 to one, and will last for at least 25 years. With Alpha, Digital is following the lead of the major

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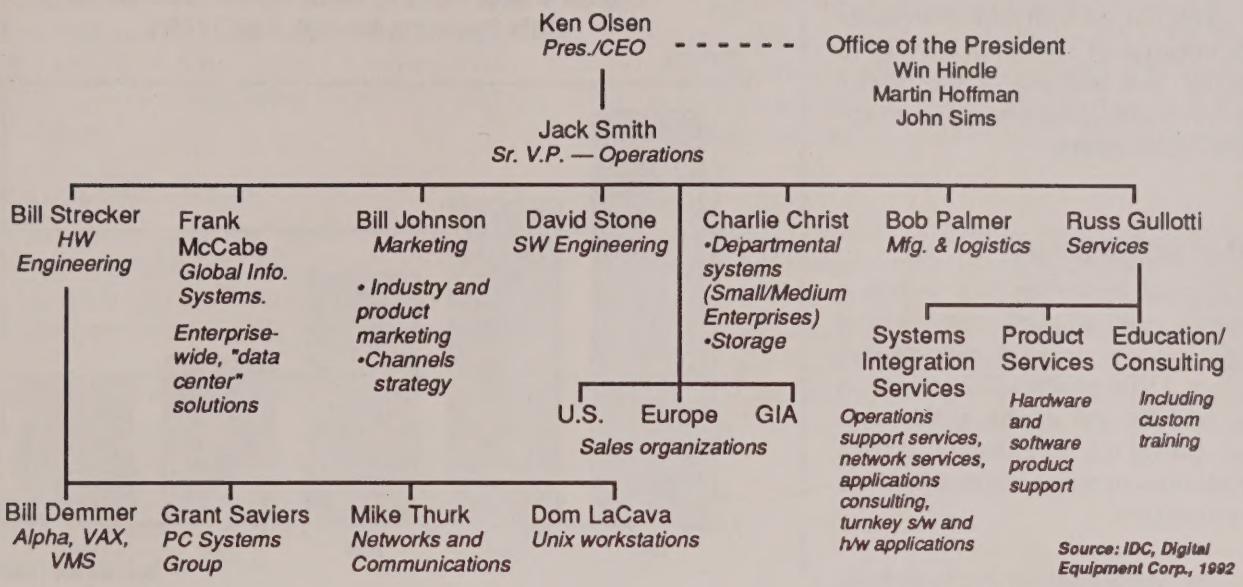
Digital Equipment Corp. Organizational Chart, 1992



IT industry influencers HP, IBM and Sun in the race to build core RISC microprocessor technologies. This is not a role the company has successfully played to date, instead it represents a fundamental change in the company's business strategy.

Digital carries four strategic imperatives with Alpha:

- to protect and expand its VMS base;
- to re-emphasize its Unix commitment, focusing on technical markets;
- to deftly juggle its workstation positioning;
- and finally to introduce a 64-bit desktop.

The four, however, are not necessarily additive. Some are mutually exclusive. The table below outlines three different strategies in Digital's two main markets: commercial and technical.

Likelihood and Potential of Digital's Alpha Options

Market Objective	Commercial Systems	Technical Systems
Protect and expand VMS base	Highly likely Low growth	Less likely Lower growth
Reemphasize Unix market	Needs more commitment Moderate growth prospects	Needs more commitment Good growth prospects
Promote Alpha running NT	Low likelihood High growth potential	Less likely Lower growth potential

Source: IDC, 1992

In general, the most likely strategies (protect and expand VAX base), offer the least growth. The riskier strategies offer higher growth potential, but are somewhat less likely.

Juggling Alpha's different objectives has negative implications for Digital's overall outlook. Catering to the VAX commercial base may weaken its high-volume OEM strategy. Focusing on the commercial Unix option may alienate the 60% of the VAX base which has not stated a desire to move to Unix-based solutions (see *User View*, p. 4).

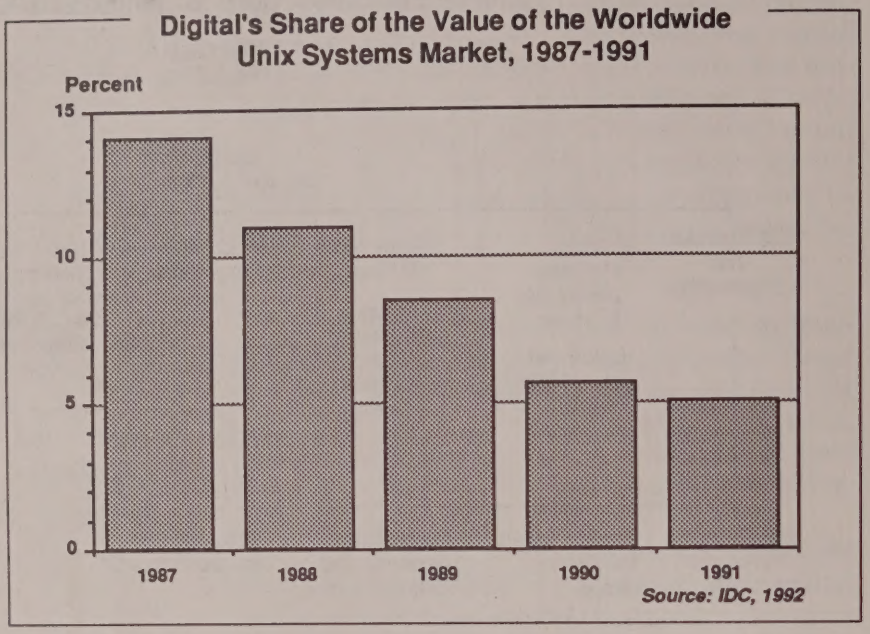
VAX Base in Transition

Digital has targeted large marketing and technical forces at the problem of keeping its installed base happy. Commercial VAX customers will be offered financial incentives that target not just the issues of software conversion but asset values as well. Thus, Digital hopes to conduct an ordered, simplified transition. Early clustering limitations (clustering will be available Q2 1993), and lack of easy upgrades are holes in the strategy, so far.

Behind Alpha's price/performance leadership and OSF/1 support, Digital will attempt to gain share in the Unix midrange. Digital will enjoy some growth, but slowing growth overall in the Unix midrange, and the increasing presence of Intel-based systems

(continued next page))

heralds overcapacity. In technical markets, Alpha will gain customers not because of customer loyalty to Digital, but because of the price/performance, functionality and support Alpha offers.



Effect on MIPS Base

Digital is trying to develop a desktop product portfolio with Intel at the lowest price and performance points, MIPS-based DECstations in the middle and Alpha at the high end (initially). Eventually, Alpha products will range across the entire product line.

The MIPS positioning is, at best, short-term. While MIPS R4000 products are set to be introduced this year, the MIPS-based product line may not have a long term future. In light of Digital's emphasis on Alpha, the MIPS products may ultimately be replaced. The small installed base of DECstations, (about 45,000 units, 3% of the worldwide workstation inventory) will not sustain the MIPS family long term.

ACE and Alpha OEM Futures

It appears that Digital is offering Alpha as a de facto addition to the ACE initiative, against the wishes of MIPS and some of the R4000 licensees. Nonetheless, it is unlikely that leading desktop OEMs will be seduced by Alpha technology alone. While Cray and Kubota will license Alpha, winning other OEMs may be harder.

Potential OEMs will watch Digital closely before they make a full-scale commitment to Alpha. Despite claims of a new business model, Digital still has a lot to learn about partnership. The company must shed the kind of thinking that served it well for thirty years before it can begin signing new partnerships. For example, analyzing the whole range of OEM arrangements — including licensing the Alpha design to competitors, selling Alpha chipsets to competitors, and selling Alpha-based systems to competitors — is itself a radical departure for the company.

A User-Eye View of the VAX/VMS Base: Strategies and Intentions

Transitioning Digital's base of VAX/VMS users to Alpha-based products will be anything but easy, according to IDC's recent survey of U.S. users (see the *Gray Sheet* 27;8, 2/28/92). The survey of 1,600 end users highlights the following facts about the VAX/VMS user base's buying plans and IT intentions:

Biggest Challenges

When questioned about their greatest IS challenges, VAX VMS users are generally happy with the technology they're using, although they feel the need to manage their computing resources more closely:

- Almost 40% of VAX VMS sites indicated that "integrating central and end-user resources" was their most important IS challenge, 10 percentage points higher than any other host environment (senior system at the site) group.
- But at least they're wiling to pay for it. Only 26.9% felt that controlling costs was the most important challenge (compared to 36.6% of IBM 370 sites).

- In addition, VAX VMS users already feel their systems are close to being state-of-the-art. Only 26.0% felt that their most important challenge was "migrating to more modern platforms."

Interest in a Unix Strategy

On the other hand, the threat from Unix is very real. Almost one-third (22.8%) of the VAX/VMS base is pursuing a Unix-oriented strategy. Another 6.8% is considering pursuing a Unix-oriented strategy.

To Centralize or Decentralize?

VAX/VMS sites are less satisfied with their current mix of centralized/decentralized resources. Digital users are moving to larger hosts in greater numbers than any other host site (12.0%), trailed closely by other Unix sites.

Use of PCs

VAX/VMS sites are currently using twice as many Macintoshes, proportionately, than any other host sites. Approximately 16.3% (weighted) of PCs in use at VAX/VMS sites are Macs. The next highest concentration of Macs, at IBM/PCM 370/390 sites is only 6.9%.

In addition, VAX/VMS sites are actively moving toward purchasing more Macintoshes. About 8.6% of VAX/VMS sites are actively increasing their commitment to Macs, well above the next closest host site. In addition, of sites that have standardized on a single PC operating environment, none has coalesced around the Mac with the force that VAX/VMS sites have.

Digital as a Disk Drive Manufacturing Company

Digital's disk drive manufacturing operation has generally been very highly regarded within the industry. The company produced high quality, high capacity, *but proprietary*, drives.

As a result, Digital was somewhat sheltered from the rapid changes that characterize OEM disk drive markets. When Digital started producing industry-standard SCSI drives starting last fall, it misjudged the moving-target price/performance expectations of major OEM customers. Its products were overpriced and underperforming.

For example, while Digital introduced a 5.25", 2GB, 3,600 rpm drive, the rest of the industry was producing 2.4 GB drives spinning at 5,400 rpm. of the same size. And, while Digital was producing an 850MB 3.5", 5400 r.p.m. drive, the rest of the industry was producing drives of the same form factor and spin speed, but which had 20-25% more capacity.

After its preliminary market miscalculations, Digital's latest products have been much more competitive. It increased the capacity of its 3.5" drive to 1GB, a capacity some competing OEMS had yet to achieve.

Digital's storage business will focus on high-performance, high-capacity disk drives. By choosing not to compete in the vicious desktop markets (where form factors, capacities and seek times improve with lightning speed) Digital's entry into the OEM business is somewhat simplified. HP chose a similar strategy when it launched its now-successful OEM strategy.

In order to successfully adapt to OEM disk drive markets, Digital faces three challenges: to increase its credibility with potential customers, to find ways to make doing business with Digital easier, and to continue to focus on reducing product time-to-market.

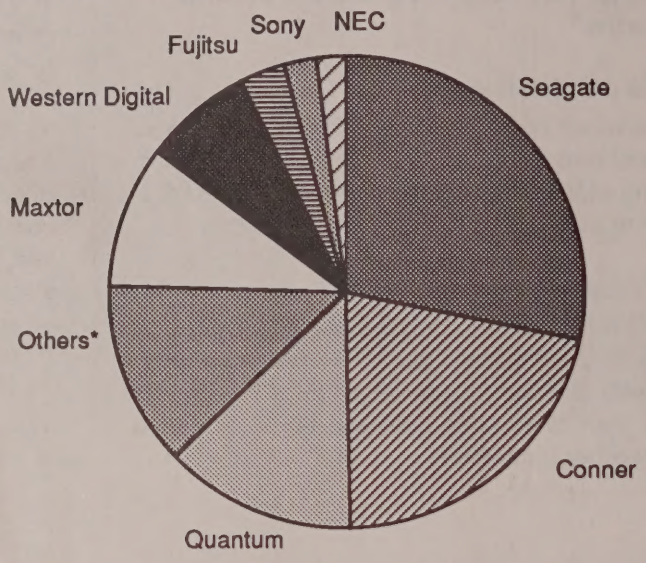
Establish Credibility

To gain credibility, Digital must deliver on its promises: quality drives in volume on time. It must establish and prove the ability to set and meet aggressive price/performance targets. It cannot afford to provide anything but they type of service that Seagate and Micropolis provide their customers. Indeed, it must focus the company to deliver service above and beyond that of its competitors.

(continued p. 7)

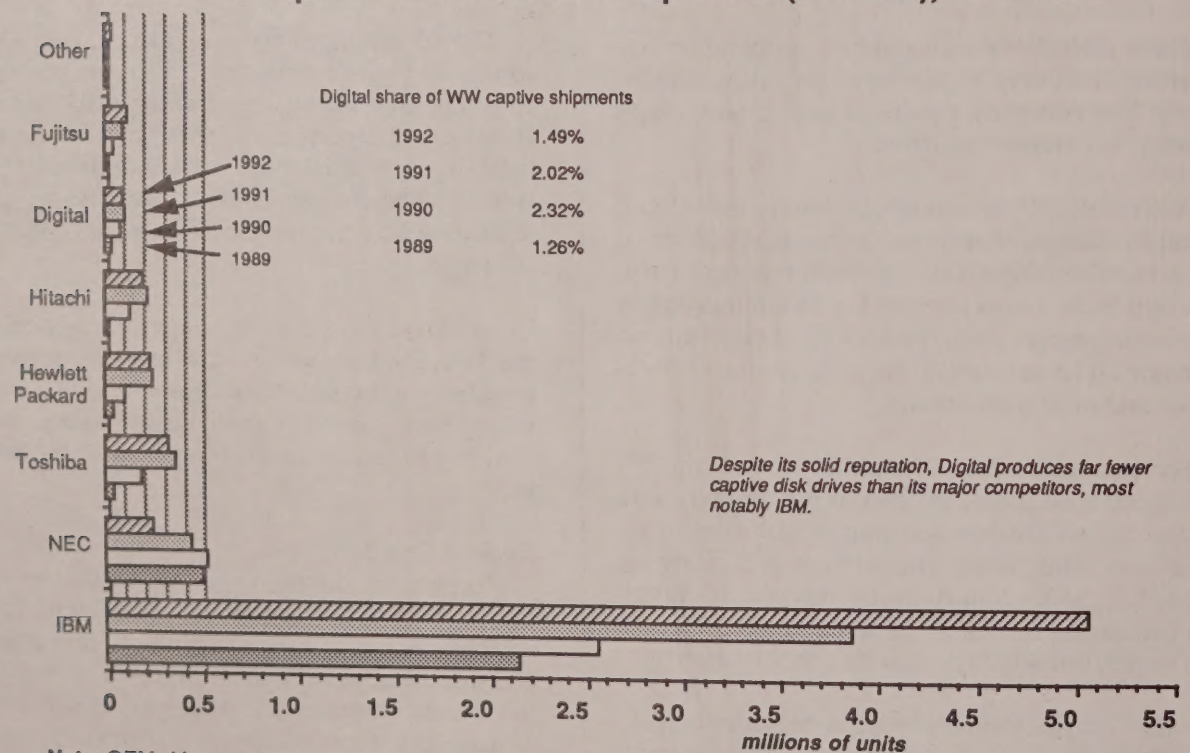
Worldwide OEM Disk Drive Unit Shipments, 1991

Total 1991 WW OEM shipments (all form factors): 28.8 million drives



* Includes: Kalok, Micropolis, IBM, Toshiba, Rodime, Hewlett Packard,, PrairieTek, Tokico, JVC, Hitachi, Microscience, Espert, Areal, Mitsubishi, Integral, **Digital Equipment**, and others.

Worldwide Captive Disk Drive Unit Shipments (millions), 1989-1992



Digital share of WW captive shipments

1992	1.49%
1991	2.02%
1990	2.32%
1989	1.26%

Despite its solid reputation, Digital produces far fewer captive disk drives than its major competitors, most notably IBM.

Note: OEM shipments are units shipped to other manufacturers for inclusion in systems, storage subsystems and other devices. Captive shipments are units delivered for use within the company's own products.

SOURCE: International Data Corporation, 1992

Ease of Doing Business with Digital

Not only must Digital aim for aggressive price/performance levels — and hit them — but it must also make the process of doing business with Digital-the OEM-supplier as easy as possible.

The proof is in the pudding. Digital has no major OEM customers for its disk drives. On the other hand, it appears that major high-performance storage subsystem manufacturers are taking Digital's products seriously, and an announcement is imminent.

Digital as a Customer Solutions and Services Company

With close $6 billion in services revenue last year, Digital ranks among the largest worldwide services companies. Its maintenance business (about $3.5 billion in 1991) is growing slowly. Its other service businesses (about $2.3 billion in 1991, generated from consulting, professional services, outsourcing, e.g.) are growing by roughly 50% annually. Both types of business are profitable.

Nonetheless, Digital faces significant challenges as it competes for non-hardware, non-software, services revenue. These include the organizational difficulties associated with moving from a product-based to a services-based business; the problem of leveraging its significant technical skills into viable products; and, the difficulty of remaining completely objective while making product recommendations.

Organization: Still Product-based ...

Digital has at least three considerable assets from which to build a world-class services/integration business: its infrastructure built from years of delivering services, a significant installed base, and technical expertise.

However, the sheer breadth of Digital's portfolio of products — from mainframes to professional services — may hinder its ability to focus on customer solutions. One look at the company's organizational chart (p.3) shows the difficulty of mobilizing resources, and staying focused on specific industries at Digital. Industry Business Units are grouped under Bill Johnson, while services are conceived and delivered by the three groups reporting to Russ Gullotti.

At first glance, it appears that the company is still geared toward manufacturing. Customer service and services organizations seem to be a bit of an afterthought. Nonetheless, the company has managed to grow its huge services businesses by 15% annually — an impressive afterthought.

A vertical market focus *and structure* may not be appropriate for Digital. It has a very wide range of services products, from consulting to multivendor PC software support. The company still generates huge revenue from basic remedial services, and its desktop integration and support services are very successful. Organizing their delivery along industry lines would probably be wasteful.

The downside risk of the company's current structure is significant. Digital certainly has the resources and expertise to compete with suppliers like EDS (whose scope is, admittedly, narrower and as a result, more focused). But unlike EDS and some other services suppliers, Digital is *focused on* industry, not *organized by* industry.

... And Striving for Objectivity

IBM has seen the need to structurally separate its outsourcing unit, ISSC, from the rest of IBM. To date, Digital has not. As long as the service side of Digital retains complete objectivity, that's not a problem.

Two seminal events at Digital, the formation of Desktop Services and Digital's first Novell sales and installations, brought the objectivity question into focus. They combined to impart a new mindset within the Services group: keep the focus on customer solutions, not Digital products. That kind of thinking is now permeating throughout the Services group. The rest of the company, the traditional product-oriented Digital, is learning to accept Services' non-biased customer focus.

Repeat-ability

For the first two years of its four-year life, Digital's SI unit was unprofitable. For the last two years it has been very profitable. The key to its sustained long-term growth and profitability will be to generate repeat wins in vertical niches.

Business solutions built upon existing products are likely to be much more profitable than solutions which must be built anew. Digital has allocated tremendous resources toward building industry-specific solutions in manufacturing, finance and telecommunications. It is just beginning to realize economies of scale within those industries. With a broadening portfolio of industry-specific products, SI should continue becoming even more profitable.

Digital's Lost Opportunity: the RISC Flip-Flop

Was last month's acquisition of MIPS Computer by Silicon Graphics the last chapter in the story of RISC at Digital? Unless Alpha becomes a huge hit (with lots of OEM customers and great success in PC markets), it may not be.

Several years ago Digital was working on a project called Prism to develop RISC chips in house. But, in September of 1988, Digital shelved Prism in favor of an OEM agreement with MIPS, citing a six-month time-to-market advantage the company would realize by using the outsourced chips. Flip.

Abandoning Prism had deleterious short-term side effects. The most important was that Digital couldn't hold on to some of the brightest RISC engineers in the business. To wit, Prism veteran David Cutler quickly went to Microsoft where he now heads NT development.

Apparently, however, Digital didn't completely discard its in-house RISC projects. While outwardly the company sold MIPS, it was not entirely committed to it. The company continued quietly developing what is now Alpha. During the past year, when rumors of MIPS demise were rampant (after major OEMS like Bull soured on MIPS), Digital might even have purchased MIPS, had the internal commitment been there. It wasn't. Flop. During that period, Digital was never truly committed to a single RISC architecture.

Last month, Digital officially announced what has been assumed, unofficially, for more than a year: internal RISC is still alive at Digital with Alpha. Flip again.

The net result is that Digital's flip-flops have muddied its hardware strategy, from PCs to supercomputers. It boasts two RISC architectures, its competitors one. Hewlett-Packard, IBM and Sun, made a choice and stuck to it. That's why they have the advantage (in single-architecture RISC deliverables) over Digital today.

The late start does not necessarily mean Digital is sunk. Digital is in the same position HP was several years ago. Only its product-line transition may be a little less painful because it is moving from 32- to 64-bit machines as opposed to HP going from 16- to 64-bit.

On the other hand, history is not in Digital's favor. In the early 1980s three companies introduced microprocessors into the commodity chip market. Intel was first. Its 8088 family has gone on to unrivalled success. The product line succeeded not because of amazing technology, but because Intel got to market "firstest with the mostest."

Motorola was second. Its 68000 was a little faster and a little more elegant than Intel's chips. Despite their technical edge, the Moto chips have remained behind Intel in terms of market share, revenues and overall profitability.

National Semiconductor's 16000 family was the latecomer. It was faster yet, and even more powerful than the 68000. But the 16000 family never really succeeded. Its advantages were rendered less significant because the market had coalesced around the two earlier products.

Alpha is no 16000. National Semi never had a base like the VAX from which to build. And it could never have even pretended that the 16000 might have a 25-year lifespan. In commodity microprocessors, the early bird gets the worm. Digital is hoping it can leapfrog today's RISC leaders and focus on the next-generation repast.

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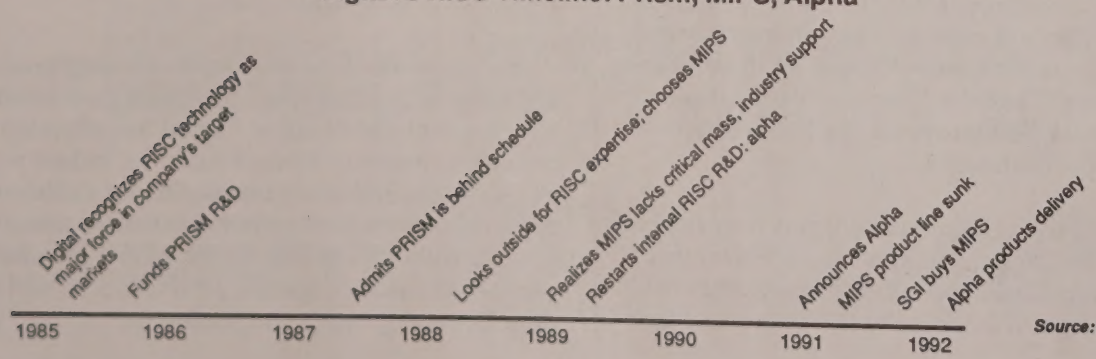
Digital's RISC Timeline: Prism, MIPS, Alpha



Source: IDC, 1992

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR APRIL 30, 1992 • VOL. 27, NO. 14 Published continuously since 1964.

The Industry Slowdown Goes Global: Worldwide IT Markets 1991 and 1992

The winter of discontent will in all likelihood be followed by another spring, summer, and autumn of thwarted hopes for many IT vendors, especially if they depend on hardware revenue.

- The overall 5.5% worldwide growth anticipated for 1992 by a consensus of International Data Corporation (IDC, publisher of *the Gray Sheet*) analysts in 36 countries would not offer a significant rebound from the industry's weak performance in 1991, which, according to a preliminary roundup of data, saw only 4% growth over 1990 (see table next page).

- The U.S., Europe, Japan, and the rest of the world (ROW) are displaying an unprecedented degree of comparability in IT growth rates. The biggest story is Japan slipping to merely human growth rates. Even so, it now represents nearly one-fifth of the global IT market.

- The worst performance has been and will continue to be in the computer systems categories, including a historic drop in the global PC market in 1991 and no expectations for a turnaround in 1992.

- Because they are continuing to perform at double-digit growth rates, software and services now represent about half of global IT spending and will surpass hardware in 1992.

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What Happened? Regional Markets

Never in recent memory have the U.S., Europe, Japan, and ROW displayed such comparably poor dynamics. The four regional markets registered **1991 growth rates more nearly equivalent than at any time in the recent past:** 4% for the U.S., 3% for Europe, 6% for Japan, and 5% for ROW (see tables page three and four).

Throughout the second half of the 1980s, when the U.S. multiuser market was mired in sluggish sales, vendors could still feed on strong growth on other shores. Global recession and past international successes in catching up to the U.S. in IT investment combined in 1991 to create virtually identical growth rates within and outside the United States as measured in local currencies.

The 4% growth registered in the **United States** was due almost entirely to the strong performance in packaged software and professional services. The 17% fall in the value of U.S. large-scale system shipments was the single largest plunge of any market segment in the four regions discussed in this bulletin.

The **European** picture was virtually a mirror image of the United States. Multiuser systems did marginally better (i.e., they slipped a little less), while PCs and workstations did a little worse; the bottom line was the same 4% slippage. Packaged software growth was on a par with the U.S., but professional services did not do as well.

Neither the U.S. nor Europe, though, had been producing especially exuberant IT results over the past couple of years. The biggest change in 1991 among major markets occurred in **Japan,** which had been luxuriating in dynamic IT sales for so long that double-digit growth seemed axiomatic.

But not last year, at least as measured in local currency. Computer hardware was only just barely in the growth column, due to the same reluctance to

IDC INTERNATIONAL DATA CORPORATION
5 Speen Street, Framingham, MA 01701 / (508) 872-8200

invest in big-ticket items and the same PC pricing pressure seen elsewhere. User recalcitrance was also a factor inhibiting professional services growth, which had typically fed ravenously on the demand for custom software. Packaged software took up much of the slack in 1991.

Even so, Japan did better than **ROW.** The global recession, international problems like the Gulf War, and internal turmoil shaved several points off the IT growth of emerging economies in Asia, the Middle East, Africa, Eastern Europe, and the Americas. The single biggest factor in the weak ROW showing, however, was the implosion of the Australian IT market, which endured the largest-ever annual drop in IT expenditures of any country tracked by IDC.

What Happened? Market Segments

Across all regions, the weakest element in the worldwide IT market was computer hardware, especially **multiuser systems.** The dip in large-scale systems was particularly sharp, down almost 11% globally. Cutbacks in big-ticket capital expenditures affected acquisitions of mainframes and high-end DASD, while the transition to ES/9000-generation systems hurt IBM. The malaise in medium-scale systems that has depressed U.S. and European sales for the past several years spread to Japan and ROW.

The only relative bright spot in multiuser systems was the small-scale segment, which registered a little forward momentum in all four regions. Most of the gain was in Unix systems and servers and low-end AS/400s; other proprietary architectures continued to lose ground.

The big news in 1991, though, was the unprecedented flat market for **single-user systems** (PCs and workstations). The principal factor was pricing pressure, which accelerated throughout the year at an astonishing rate. User saturation, while a problem, had a less pernicious effect, since many sites in IDC's

Worldwide IT Markets by Category, 1990-1992
Current Dollars ($M)

	1990	1991	1992
Large-scale	$30,793	$27,769	$27,585
Medium-scale	25,458	24,887	24,236
Small-scale	23,425	24,270	25,081
Multiuser	79,676	76,926	76,902
PC/workstations	67,325	67,051	67,000
PC add-on	11,269	11,512	11,817
Single-user	78,595	78,563	78,817
System	158,270	155,489	155,719
Packaged software	44,716	50,774	57,994
Data communications	10,011	10,682	11,680
Professional services	58,085	65,396	73,013
Support services	43,398	45,116	47,100
Services	101,483	110,512	120,113
Total	$314,480	$327,457	$345,506

Source: IDC, 1992

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Worldwide IT Markets by Region and Category, 1991, at 1991 Exchange Rates ($M)

	U.S.A.	Europe	Japan	ROW*	Total
Large-scale	$8,220	$8,809	$7,950	$2,790	$27,769
Medium-scale	6,810	7,853	5,880	4,344	24,887
Small-scale	8,450	7,295	6,140	2,385	24,270
Multiuser	23,480	23,957	19,970	9,519	76,926
PC/workstations	25,315	23,028	10,360	8,348	67,051
PC add-on	4,560	4,145	1,555	1,252	11,512
Single-user	29,875	27,173	11,915	9,600	78,563
System	53,355	51,130	31,885	19,119	155,489
Packaged software	20,660	20,536	5,450	4,128	50,774
Data communications	$5,250	2,873	1,330	1,229	0,682
Professional services	20,180	23,004	18,460	3,752	65,396
Support services	18,550	16,867	6,300	3,399	45,116
Services	38,730	39,871	24,760	7,151	110,512
Total	$117,995	$114,409	$63,425	$31,627	$327,457

Source: IDC, 1992

NOTE: Throughout this report the label "Europe" is used to refer to the 13 countries of Western Europe traditionally tracked by IDC's European offices: Germany, France, UK, Italy, Belgium Sweden, Denmark, Norway, Finland, Switzerland, Austria and Spain. The European totals would be somewhat larger if Greece, Portugal, Ireland and the Eastern Europe countries were transferred from ROW.

survey continue to report high demand or a need to replace terminals with desktop systems. Moreover, the proportion of the base with more than one PC has been dramatically increasing with the proliferation of notebooks.

The best record for any hardware category fell to **data communications** equipment, fueled by strong LAN hardware results. The Year of the LAN finally occurred in 1991, not so much in the U.S., where LAN technology has steadily established itself, as in international markets, with impressive results in Europe and the first major PC LAN penetration in Japan.

The overall weak performance of hardware in 1991 affected the hardware maintenance core market within **support services.** What growth occurred was due primarily to new contracts on PCs, workstations, and data communications equipment installed in earlier years, and to related services like disaster recovery.

The stellar performers were packaged software and professional services. In **software,** IBM's relatively unimpressive showing was offset by a vigorous performance by many independent software vendors. While systems software and utilities lagged, tools and application solutions held up strongly.

Professional services also cracked the double-digit growth barrier. Notable growth by IBM, EDS, and other U.S. professional services giants was reflected in the 16% U.S. expansion in this sector, which was the major factor contributing to a higher overall IT growth rate in the U.S. than in Europe. Professional services growth in Europe and Japan, which has traditionally been at a comparable rate, slackened somewhat.

The net effect was a near-equilibrium of hardware (systems and data communications equipment) and software and services (packaged software, professional services, and support services) in 1991. In 1991 the U.S. joined Europe in allotting a higher proportion of external IT expenditures to software and services than to hardware, while Japan began to approach equilibrium.

Barring a dramatic and unanticipated turnaround in hardware sales, the worldwide IT market will mark a watershed in 1992: for the first time, less than half of global expenditures will be for hardware.

More of the Same in '92

This transition will result from a continuation of trends in 1991 rather than a sharp break with last year.

(continued next page)

The firm if disquieting consensus among IDC program managers and international researchers, as well as the user base in the global IT Customer Directions and Spending Strategies Survey, is that the worldwide IT market will remain in a holding pattern: there will be only modest improvements in regional markets and individual market segments.

Growth of 5.5% would bring the global IT market to from $327.5 to $345.5 billion. U.S. expansion would be a little better than 5%, Europe over 4%, Japan 7.5%, and ROW 6.5%. The marginal improvements over 1991 growth rates are related in part to an expectation that the U.S. economy will enjoy a fourth-quarter election-eve spurt, and that the recession will start to loosen its grip elsewhere by the end of the year.

Growth in packaged software and services, the only industry sectors capable of sustaining double-digit growth, would be comparable to 1991. The modest overall improvement in IT spending expected for 1992 over 1991, then, is essentially a function of less traumatic dips in the system hardware categories.

Multiuser systems will be flat compared to 1991, although large- and medium-scale systems will have another slightly down year. Even flat would not help them much, because these sectors have lost so much ground in the U.S. and Europe that flat is the moral equivalent of down. The only positive growth will once again be in small-scale systems.

The single-user market will also be flat. In the U.S. and Europe, the same sharp plunge in prices that roiled the market in 1991 will be continuing through most of 1992 and counterbalance growth opportunities elsewhere.

The net effect globally will be flat system sales, in contrast to a dip of over 2% last year. Vendors may start to stanch some of the bleeding, but low demand for computer hardware will remain an open wound throughout 1992.

1991: Local vs. U.S. Dollar Growth

IDC has traditionally stated the historical and present value of IT markets in current dollars by inflation and exchange rates. The recurring question "how big is (or was) the market?" demands a single answer, and the continuing preeminence of U.S.-based vendors in the industry has made the U.S. dollar the benchmark for measurement.

IDC also recognizes, though, that the extreme fluctuations of the dollar against the yen and major European currencies in the 1980s and 1990s have often affected the size of the computer market more

(continued p. 6)

Annual Change in Worldwide IT Markets by Region and Category, 1990-1991, in Local Currencies

	U.S.A. (%)	Europe (%)	Japan (%)	ROW (%)	Total (%)
Large-scale	-17.3	-11.8	0.5	-11.6	-10.6
Medium-scale	-4.4	-3.9	0.3	-1.9	-2.8
Small-scale	3.0	1.1	5.9	0.8	2.9
Multiuser	-7.0	-5.6	2.0	-4.3	-4.1
PC/workstations	-1.1	-2.9	1.0	8.6	-0.3
PC add-on	3.4	0.0	1.0	8.6	2.3
Single-user	-0.5	-2.5	1.0	8.6	0.0
System	-3.5	-4.0	1.6	1.8	-2.1
Packaged software	13.8	14.1	15.1	13.9	14.1
Data communications	5.0	9.0	9.9	6.1	6.8
Professional services	16.0	8.9	10.0	15.0	11.7
Support services	4.7	3.2	7.4	3.7	4.4
Services	10.3	6.4	9.3	9.3	8.6
Total	3.9	2.8	5.8	5.0	3.6

Source: IDC, 1992

Worldwide IT Markets by Region and Category, 1992 ($M)

	U.S.A.	Europe	Japan	ROW	Total
Large-scale	$8,340	$8,545	$8,000	$2,700	$27,585
Medium-scale	6,470	7,382	5,900	4,484	24,236
Small-scale	8,535	7,514	6,550	2,482	25,081
Multiuser	23,345	23,441	20,450	9,666	76,902
PC/workstations	24,660	22,551	11,000	8,789	67,000
PC add-on	4,480	4,369	1,650	1,318	11,817
Single-user	29,140	26,920	12,650	10,107	78,817
System	52,485	50,360	33,100	19,773	155,719
Packaged software	23,540	23,254	6,400	4,800	57,994
Data communications	5,680	3,200	1,450	1,350	11,680
Professional services	23,200	25,120	20,500	4,193	73,013
Support services	19,300	17,522	6,720	3,558	47,100
Services	42,500	42,642	27,220	7,751	120,113
Total	$124,205	$119,457	$68,170	$33,674	$345,506

Source: IDC, 1992

Annual Change in Worldwide IT Markets by Region and Category, 1991-1992 ($M)

	U.S.A. (%)	Europe (%)	Japan (%)	ROW (%)	Total (%)
Large-scale	1.5	-3.0	0.6	-3.2	-0.7
Medium-scale	-5.0	-6.0	0.3	3.2	-2.6
Small-scale	1.0	3.0	6.7	4.1	3.3
Multiuser	-0.6	-2.2	2.4	1.5	-0.0
PC/workstations	-2.6	-2.1	6.2	5.3	-0.1
PC add-on	-1.8	5.4	6.1	5.3	2.6
Single-user	-2.5	-0.9	6.2	5.3	0.3
System	-1.6	-1.5	3.8	3.4	0.1
Packaged software	13.9	13.2	17.4	16.3	14.2
Data communications	8.2	11.4	9.0	9.8	9.3
Professional services	15.0	9.2	11.1	11.8	11.6
Support services	4.0	3.9	6.7	4.7	4.4
Services	9.7	7.0	9.9	8.4	8.7
Total	5.3	4.4	7.5	6.5	5.5

Source: IDC, 1992

than internal dynamics, especially as the non-American sales base grew in size and significance. It is necessary to strip away the effect of currency translation to determine the actual growth and potential of international markets.

The table below depicts the 1990 base against which all 1991 growth rates are derived. The following table shows what the 1991 market would have looked like in 1990 dollars, without last year's currency fluctuations. The growth rates from 1990 are therefore the same as the local currency rates in the table on page four.

This local currency view can be contrasted to the U.S. dollar scenario in the bottom table on page seven. European currencies, which are more or less tightly bound to the fortunes of the deutsche mark, zigged and zagged against the dollar throughout 1991, but the cumulative effect was to lop around 3% off the size of the European market as measured in 1991 dollars. After the yen's oscillations, on the other hand, its rise wound up giving a 7% dividend in U.S. dollars.

Ironically, the contrary movements effectively canceled each other out. In current dollar terms, the European IT market was flat, whereas Japan's grew 13%. However, because the European market is so much bigger than the Japanese market, the net was essentially the same 4% worldwide growth registered in local currencies.

But the relative positions of currencies can have a serious impact on the distribution of slices of the IT market pie. In 1990, for example, the European IT market for the first time surpassed the U.S. in size, mainly due to a massive infusion from currency translation. As of 1991, however, the U.S. has regained precedence over Western Europe, whereas Japan has increased its market share against both. Since the local currency growth rates were so nearly equivalent, these changes must be ascribed preeminently to exchange rates.

It should also be noted that the Europe described in these tables and figures comprises the 13 countries tracked in IDC's annual European reports. If Greece, Portugal, Ireland, and the Eastern European states were included in the total, Europe and the U.S. would be about the same size.

Finally, the currency effect, although of trivial consequence in worldwide growth terms, had a somewhat deleterious effect on U.S.- based vendors. The gains in dollars vis-a-vis yen had a lesser effect than the losses vis-a-vis European currencies, because U.S. vendors have a much higher market share in Europe than in Japan.

Worldwide IT Markets by Region and Category, 1990 ($M)

	U.S.A.	Europe	Japan	ROW	Total
Large-scale	$9,940	$10,268	$7,410	$3,175	$30,793
Medium-scale	7,120	8,404	5,485	4,449	25,458
Small-scale	8,200	7,417	5,430	2,378	23,425
Multiuser	25,260	26,089	18,325	10,002	79,676
PC/workstations	25,600	24,401	9,605	7,719	67,325
PC add-on	4,410	4,261	1,441	1,158	11,269
Single-user	30,010	28,662	11,046	8,877	78,595
System	55,270	54,751	29,371	18,879	158,270
Packaged software	18,150	18,493	4,430	3,643	44,716
Data communications	5,000	2,709	1,137	1,165	10,011
Professional services	17,390	21,706	15,712	3,277	58,085
Support services	17,810	16,800	5,491	3,297	43,398
Services	35,200	38,506	21,203	6,574	101,483
Total	$113,620	$114,459	$56,141	$30,261	$314,480

Source: IDC, 1992

Worldwide IT Markets by Region and Category, 1991, at 1990 Exchange Rates ($M)

	U.S.A.	Europe	Japan	ROW	Total
Large-scale	$8,220	$9,055	$7,450	$2,807	$27,532
Medium-scale	6,810	8,072	5,500	4,365	24,747
Small-scale	8,450	7,499	5,750	2,396	24,095
Multiuser	23,480	24,626	18,700	9,568	76,374
PC/workstations	25,315	23,695	9,700	8,384	67,094
PC add-on	4,560	4,261	1,455	1,258	11,533
Single-user	29,875	27,956	11,155	9,642	78,628
System	53,355	52,582	29,855	19,210	155,002
Packaged software	20,660	21,109	5,100	4,149	51,018
Data communications	5,250	2,953	1,250	1,236	10,689
Professional services	20,180	23,646	17,285	3,768	64,879
Support services	18,650	17,338	5,900	3,420	45,308
Services	38,830	40,984	23,185	7,188	110,187
Total	$118,095	$117,628	$59,390	$31,783	$326,896

Source: IDC, 1992

Annual Change in Worldwide IT Markets 1990-1991 in U.S. Dollars ($M)

	U.S.A. (%)	Europe (%)	Japan (%)	ROW (%)	Total (%)
Large-scale	-17.3	-14.2	7.3	-12.1	-9.8
Medium-scale	-4.4	-6.6	7.2	-2.4	-2.2
Small-scale	3.0	-1.6	13.1	0.3	3.6
Multiuse	-7.0	-8.2	9.0	-4.8	-3.5
PC/workstations	-1.1	-5.6	7.9	8.1	-0.4
PC add-on	3.4	-2.7	7.9	8.1	2.2
Single-user	-0.5	-5.2	7.9	8.1	-0.0
System	-3.5	-6.6	8.6	1.3	-1.8
Packaged software	13.8	11.0	23.0	13.3	13.5
Data communications	5.0	6.0	17.0	5.5	6.7
Professional services	16.0	6.0	17.5	14.5	12.6
Support service	4.2	0.4	14.7	3.1	4.0
Services	10.0	3.5	16.8	8.8	8.9
Total	3.9	-0.0	13.0	4.5	4.1

Source: IDC, 1992

A Note on IDC's Worldwide Data Collection Methodology

Over the past three months IDC has been consolidating early returns on 1991 from U.S.-based programs and international offices and polling its worldwide network of analysts on the prospects for 1992. This issue of *the Gray Sheet* represents IDC's current view of what happened last year, and what will happen (or, unfortunately, what won't happen) in 1992.

The data is our best current view of consistently defined markets. The preliminary estimates for 1992 are based both on the expertise of IDC's industry watchers and on user purchase plans as outlined in the IDC 1992 IT Customer Directions and Spending Strategies Survey of 6,650 sites in the U.S., Germany, France, the U.K., and Japan.

Reviews and forecasts for individual markets and IDC offices will be developed during the year. Although we do not anticipate major changes from the estimates offered in this bulletin, there will undoubtedly be minor adjustments. Updates for 1991 and 1992, five-year forecasts, and country-level data for each market segment will be consolidated this summer in the third annual IDC "Worldwide Black Book," *Worldwide Information Technology Spending Patterns, 1991-1996.*

The Mark Twain Principle Goes Global

Back in the mid-1980s during what we were calling the Great Softness, *the Gray Sheet* announced the Mark Twain Principle. In Chapter 16 of *Life on the Mississippi*, Twain mused that, over 176 years of recorded measurements, the Mississippi River had become shorter at a rate of 1.375 miles a year:

> Therefore, any calm person, who is not blind or idiotic, can see that in the Old Oolitic Silurian Period, just a million years ago next November, the Lower Mississippi River was upwards of one million three hundred thousand miles long, and stuck out over the Gulf of Mexico like a fishing-rod. And by the same token any person can see that seven hundred and forty-two years from now the Lower Mississippi will be only a mile and three quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and a mutual board of aldermen.

"There is," Twain concluded, "something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact."

Applied to other areas, the Mark Twain Principle implies that extrapolations from current conditions must be tempered by a modicum of common sense. Applied to the IT industry, it suggests that (1) there were natural limits to the growth rates displayed in palmier days, and (2) today's dynamics are not necessarily etched in stone either.

Take the worldwide PC industry, for instance. It would have been pretty if global double-digit growth could have continued indefinitely, but if so, laptops would before long be sticking out like fishing rods over the Gulf of Mexico, the Bay of Biscay, and the South China Sea.

As for revenue growth, new generations of chips used to keep PC ASVs afloat as earlier designs commoditized. But it was probably inevitable that eventually LAN penetration and the nature of PC usage would cap demand for high-end PCs and drive average ASVs into a tailspin.

Nevertheless, growth for PC vendors is still possible. Many are emphasizing servers, which play off the LAN explosion and nestle in IDC's small-scale market, the only systems category to experience positive growth in 1991. And as noted on p. 3, the notebook phenomenon is the latest indication that the market is not limited to one PC per person.

Now, take Japan. Over the past year, the Japanese economy and IT market proved they are no longer immune to the Shylock test: if you prick them, they will bleed.

As Mark Twain reminds us, Japan's IT market simply could not have sustained double-digit expansion indefinitely. With GNP growth slumping to 4.2% in 1991, the Mark Twain Principle took effect sooner rather than later. And with GNP growth expected to dip below 3% in 1992 and to fall in the 3-4% range for the next few years, it seems safe to assume that double-digit IT expansion in Japan is one tradition that they cannot sustain.

On the other hand, the drop in growth rates can't be extrapolated indefinitely, either. The proportion of Japan's GNP devoted to IT products is still at the worldwide mean, well below the ratio seen in many other established economies. Japan has a lot of growing room in markets where it is currently underrepresented, including desktop systems and packaged software.

Finally, let's look at software and professional services. Nothing, including double-digit growth in these markets, is impervious to Mark Twain's wisdom. In the year 2121, we won't see half of the world GDP going for systems integration even if Ross Perot gets elected U.S. president in 1992.

But software and professional services should continue to display stronger internal dynamics than other market segments because, unlike other IT products, they take money from internal MIS rather than only from each other. User budgets under pressure will have to distribute expenditures in more cost-effective ways, which will often mean turning to outside suppliers.

There is indeed something fascinating about the science of industry watching, especially if you investigate enough facts.

Todd C Bellamy

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR MAY 22, 1992 • VOL. 27, NO. 15 Published continuously since 1964.

Aging Clones: the Growing Challenge for Intel PC Makers

Makers of Intel-based PCs have more than the usual reasons to be worried. For one thing, lower prices are a less significant differentiator when everyone has them. The implications of plummeting hardware prices for the industry may be at hand. Everex's announced purchase of Northgate foretells future consolidation and retrenching; Packard-Bell's shaky IPO underscores widespread uncertainty about the future for clone makers. Both situations stem from, among other things, the following:

- Lower industrywide growth rates: the rising tide that lifted almost all boats for the past decade has ebbed. IDC's latest projections call for incremental unit growth and flat revenue. A good product at a good price may no longer be enough to sustain small PC makers.

- Continued severe price erosion in 1992: flat-to-down revenue means difficulties for debt-ridden and thinly-capitalized PC makers. Companies will continue to attempt to offset the bloody low end with higher margin mid-and high-end sales, including software and services sales.

- Renewed competition from IBM: Jim Cannavino has been running IBM's PC business for almost four years. According to some reports, he may not have many more years to stem the decline of IBM market share and PC revenue. Among his possible options are to slash prices or to develop competitive low-price lines that IBM would sell concurrently with the PS/2 product set. Either way, second-tier PC makers are foremost in Cannavino's crosshairs.

- Potential get-tough pricing from Compaq: it is rumored to be willing to use its $700 million in the bank to price PCs where it wants AST and Dell to compete. That could mean trouble for other PC makers, starting next month when Compaq unveils its first wave of post-Canion products.

- Zero-sum notebook growth: there isn't enough really new about portable PCs — and the portable market isn't big enough — to offset slagging overall PC growth. The only "new" portable computer market is in pen based and palmtop portable computing.

- Renewed competition from others: systems companies like Digital Equipment are opening new direct sales channels. They too are aiming directly at low-cost producers.

Longer term, PC makers may face more fundamental change. The mere size of the Intel base, and the investment in the Intel architecture by NEC, Cyrix, AMD, Cypress and others, will in all likelihood guarantee its future viability. Nonetheless, Intel PC makers need to keep an eye on the future. That means the potential for even greater competition:

- Possibility of a declining duopoly: the specter of a shift to one or several new processor/OS paradigms may reshape PC makers' long-range plans. As combinations of faster, larger microprocessors and more robust,

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easier-to-use operating systems nibble at the edges of the Intel/Microsoft duopoly, PC makers face the possibility of fundamental changes to their businesses. While this is largely a long-range issue, it remains in the back of PC makers' minds.

- Pressure from above: manufacturers of RISC-based technical workstations are stalking the commercial "personal workstation" market. Meanwhile, details of Intel's P5 processor are becoming public. Clone makers will soon incur greater expenses designing high-end personal computers (to keep up with RISC workstations) that unit margins may not support.

The net result for PC makers is a generally gloomy outlook. While there's still money to be made selling Intel PCs, it's getting more difficult to make it. Three broad categories of differentiation are emerging.

Almost all Intel PC manufacturers seek *differentiation on product features*. But few rely exclusively on features. Most manufacturers also try to differentiate by juggling different delivery channels or through aggressive pricing. Only a couple of traditional leaders of the PC business, most notably IBM Compaq, rely solely on product features (including their customer service and support infrastructures) for differentiation, and they're trying to reshape themselves to address the current market conditions.

Other PC makers seek to provide *competitive features at rock-bottom prices* and make prices the focus of their differentiation. Many of them purchase low-cost components from offshore suppliers and then assemble the PCs locally. Often, however, these manufacturers end up trading inconsistent quality standards for short-lived market share and do little to engender long-term customer loyalty.

Finally, some other Intel PC makers seek *differentiation on distribution channels* and customer service. They employ flexible manufacturing systems that might cost a little more, but allow the manufacturer closer contact with the buyers. They can then (theoretically) design customized marketing programs to build even tighter relationships with prospective buyers and clients.

Some Vital Statistics: Leading PC Makers

	AST	Compaq	Dell	Gateway
1991 Revenue (calendar) ($million)	827	3,271	546	620
1991 U.S. Unit Shipments	271,560	390,000	158,880	246,774
1991 Non-U.S. Unit Shipments	183,802	466,080	61,700	21,445
U.S. Sales as Percent of Total Sales	60%	46%	72%	92%

Source: IDC, 1992

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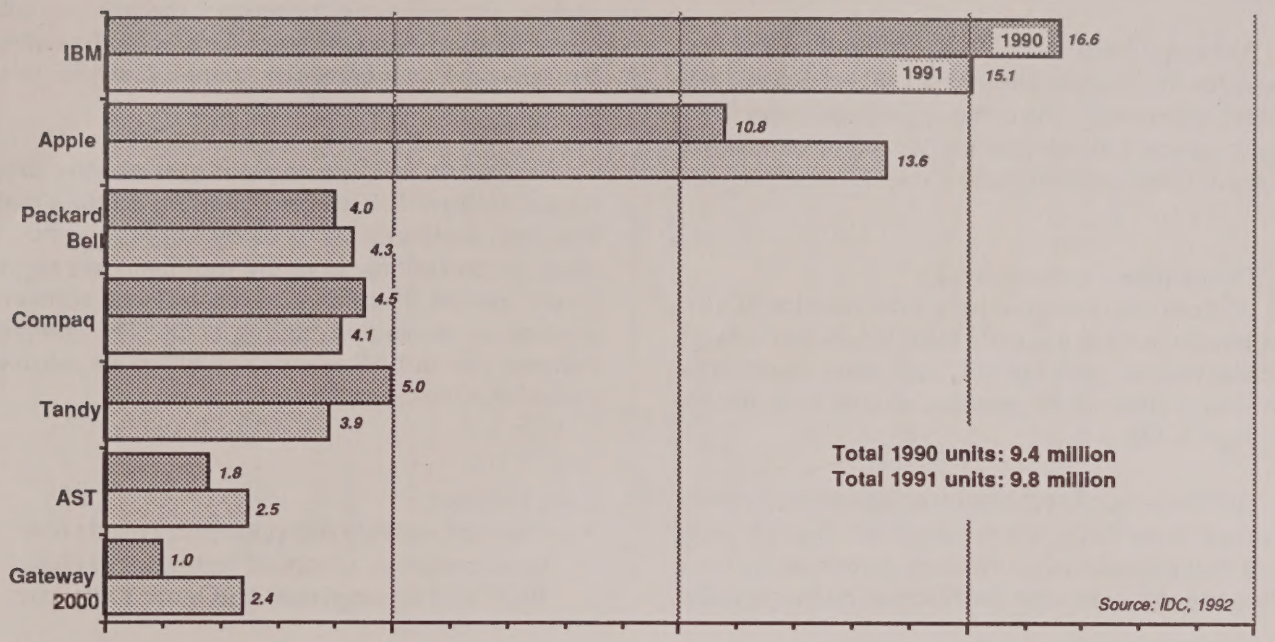
Leading Intel PC Makers' U.S. Unit Market Share, 1990 and 1991



Percent of total unit shipments in the United States, 1990-1991

The three broad strategies are far from mutually exclusive. They are, more likely, highly complementary. Achieving success in today's Intel PC market requires a strong overarching plan that coordinates efforts to differentiate in each area.

In this issue of the *Gray Sheet* we take a closer look at the strategies of three PC makers — AST Research, Dell Computer Corporation, and Gateway 2000.

AST Research

Having grown into the PC business by way of add-on boards for IBM PCs, AST Research has a history of bringing PC features and technology to market. As a result, the company's primary differentiation focus remains in hardware features. Nonetheless, its flexible manufacturing and distribution channel management — in addition to great products — lift it into the top of the group of PC makers.

Hardware Features and Design

Innovating within standards necessitates some compromises. AST seems to have been able to strike a healthy balance. The company is regularly among the fastest PC companies to get products with new features to market. Indeed, it has replaced Compaq in this role. Additionally, much of the original EISA specification was constructed around AST's contributions to the design process.

AST recently announced several further advances that push its technological leadership. Its long history of investment in ASICs is paying off: all AST PCs contain AST ASICs. In addition, AST is one of the few companies currently producing four-layer boards, increasing reliability and density. Finally, AST is now shipping flash BIOS that can be updated by a variety of means: floppy disks, networks or phone lines.

Manufacturing

Unlike many PC makers, AST owns all of its manufacturing capacity. Consequently, it has a greater degree of control over the quality of all of its PC products, and it enjoys a time-to-market advantage with many of them.

In addition, AST claims highly flexible manufacturing lines. It says it can change a manufacturing line in 15 minutes, and that it will custom-build large orders for distribution partners and OEM customers for shipment directly to end users. On an individual PC basis, however, AST feels that customizing units

for delivery to end users is clearly the responsibility of its channel partners.

Although such flexibility is generally a requirement for PC makers today, AST views it as an enabling technology. The company does not regard its highly vaunted manufacturing capabilities as a source of great differentiation, as do some of its competitors.

Distribution/Customer Service

AST relies on four channels of distribution: VARs, dealers (including many de facto VARs and VADs), OEMs/federal government, and mass merchants. The lion's share of its product, almost 60%, travels through VARs.

AST feels that direct telesales, the hottest delivery channel these days, is a passing fad. The company feels that telesales organizations conveniently have filled a need for low-cost distribution, but they gradually will be replaced by mass merchandisers and consumer electronics stores within five years. Nonetheless, the company recognizes the psychological advantages telesales organizations hold: they advertise street prices, whereas companies like AST generally advertise suggested retail prices.

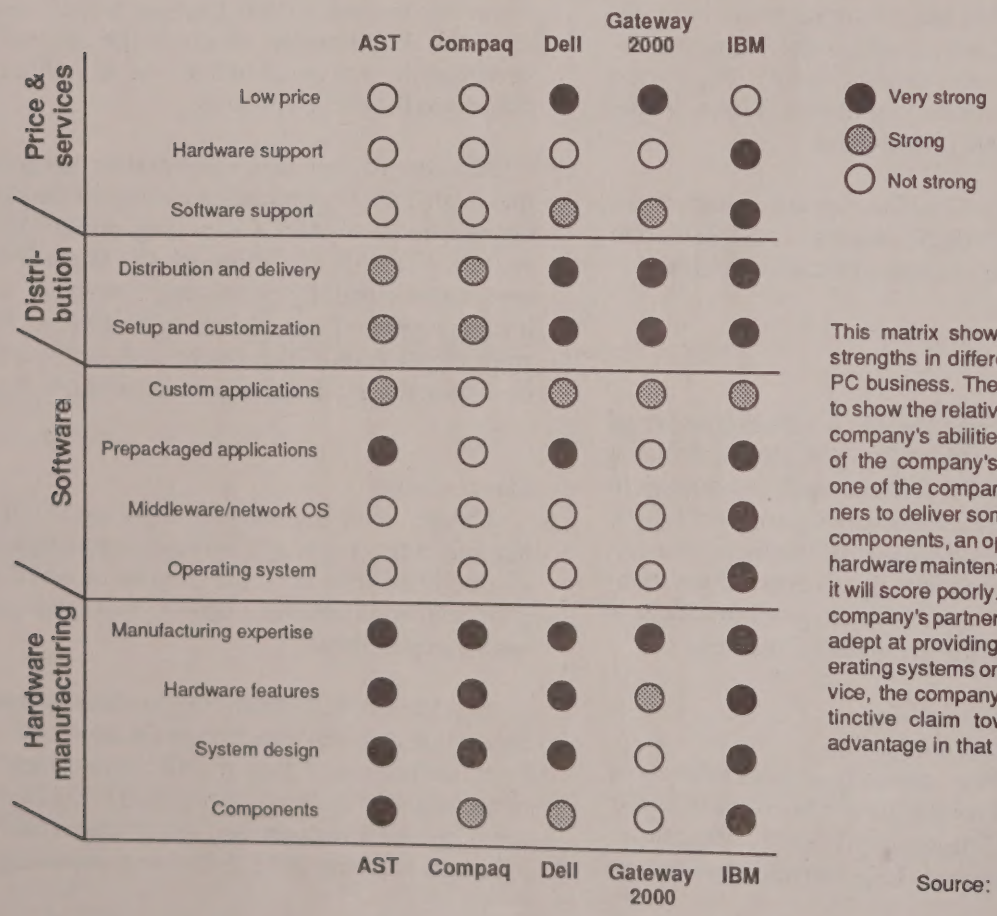
As a result, AST has no plans to establish a direct telesales effort. It is instead banking on the greater freedom of selection offered by larger, low-budget retail organizations. In recent months it has aggressively moved into mass merchandisers, consumer electronics stores and buying clubs. The company believes that in 1993 as much as 30% of its sales will come from these types of outlets.

Key Challenges

- Can AST actually deliver results based on its investments in advanced technology? Flash BIOS and homegrown ASICs are nifty, but

(continued p. 6)

A Matrix of PC Makers Strengths and Abilities



This matrix shows PC companies' strengths in different aspects of the PC business. The marks are meant to show the relative strength of each company's abilities, not the abilities of the company's partners. Where one of the companies relies on partners to deliver something (hardware components, an operating system or hardware maintenance, for example) it will score poorly. Even though that company's partner may be extremely adept at providing components, operating systems or maintenance service, the company itself has no distinctive claim toward competitive advantage in that area.

Source: IDC, 1992

Profiles of Intel PC Makers

	Design	Component Manufacturing	System Assembly	Distribution	Marketing/Sales	Price
AST	Features leaders	Builds its own boards, ASICs	Owns manufacturing plants	All indirect	Little customer contact	Moderate; leaders in some categories
Compaq	Features leaders	Builds own boards, chips monitors. Large internal R&D	Owns plants, some fat to be trimmed	Heavily skewed toward dealers	Recent overhauls: large question about dealer channel remains	Perceived price premium; may change 6/92
Dell	Followers, but becoming more aggressive	Outsources manufacturing of most subsystems, some systems. Large internal R&D	Assembly plants among industry's most efficient	Highly efficient telesales now augmented by on-site direct sales force	Network of superstores, direct sales are to cost/volume leaders	Moderate. Key advantage: able to advertise street price, not MSRP
Gateway 2000	Followers; rely on suppliers for R&D	None: all purchased from Low-cost offshore suppliers; some quality questions	Minimal assembly of major system components	Highly efficient, low-cost telesales	Efficient telesales; some outbound to major accounts	Price leader Cost-plus model: good high-end margins, lower on low end
IBM	Standard and trend setters	Owns plants; even builds its own X86s	Owns all facets;	Expensive direct sales force; heavily reliant on margin-conscious delalers	Strong but very expensive infrastructure	Perception that PS/2 is way over priced

Source: IDC, 1992

translating them into market share is something else.

- Can AST successfully forecast and juggle channels to catch the biggest waves?
- Can it stay innovative in portable product design and pricing?
- Can it continue to deliver new "hit products" like the Prem Exec and Bravo series?

Dell Computer Corporation

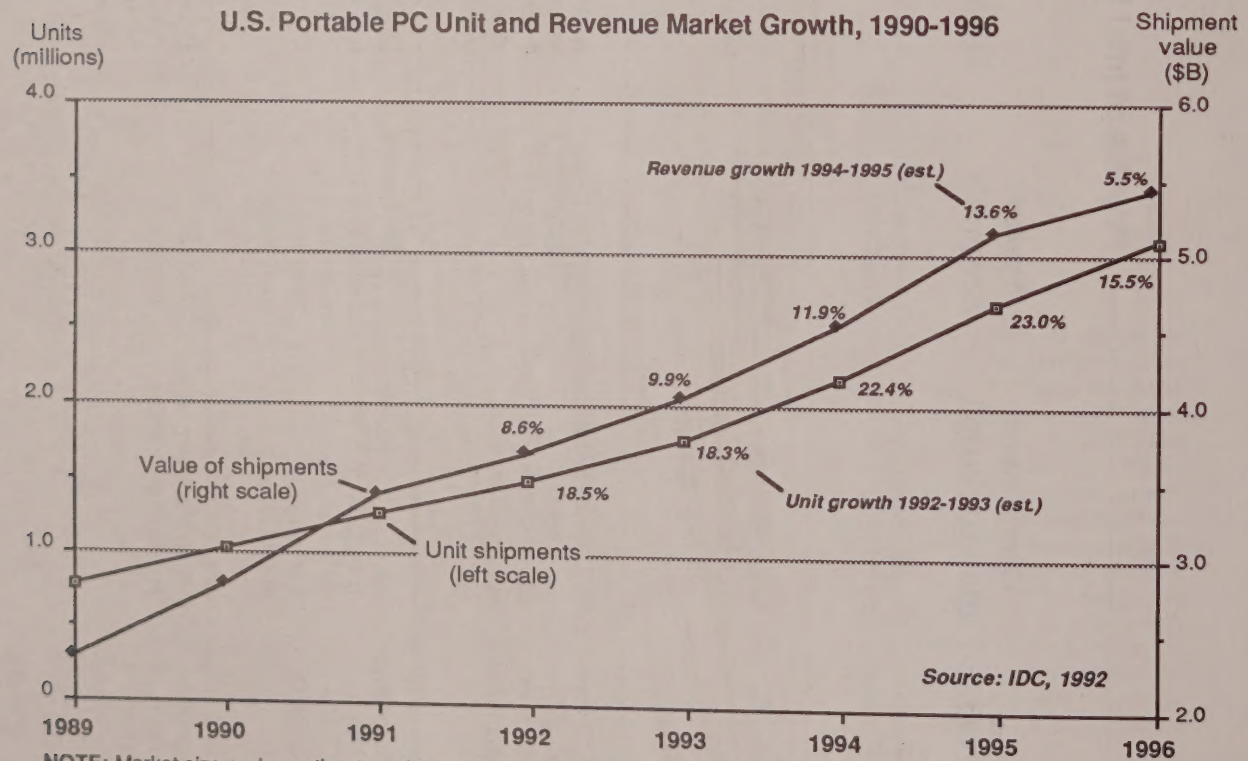
One important benefit accrues to companies that operate their own direct sales force and distribution/support/service organizations: they get immediate feedback from customers. Companies that act upon the information can gain a critical time-to-market advantage over competitors who get such information second hand (through a network of dealers, for example). Dell Computer is, above all else, a marketing (the "place" P in the five Ps of marketing ...) organization.

Customer service is at the heart of Dell Computer's overall strategy. It drives Dell's efforts to differentiate in two areas: building hardware and delivering solutions through "customized manufacturing." And it drives Dell's attempts to provide all kinds of differentiation.

Hardware Features and Design

From network servers to notebook PCs, Dell's product line is among the top tier of price performers. For example, its 50MHz 486 server was shipping months ahead of similar products from Compaq and IBM. Its color 386 notebook was among the first on the market.

In addition, the company claims it has developed dozens of patents for its hardware designs. Nonetheless, Dell's technical proficiency offers little real product feature differentiation. Time-to-market advantages are windows that can be slammed shut quickly by dozens of PC companies. To date, Dell's products have been category leaders, but not groundbreakers.



NOTE: Market size and growth rates within different segments of the mobile PC markets vary tremendously. For example, the unit shipment and revenue data in this chart is an aggregate of data in the following mobile PC categories: **IBM-compatible** AC-portables/transportables, battery laptops, notebooks and subnotebooks; **Macintosh** battery laptops, notebooks and subnotebooks; and **Other** AC-portables/transportables, battery, laptops, notebooks and subnotebooks. It includes **pen-based computers,** but does not include hand-held data computers or palmtops. For a complete analysis of all mobile PC markets, see IDC's *U.S. Portable Computer Market Update*, or contact Bruce Stephen at (508) 935-4269.

Manufacturing

Dell owns assembly facilities in Texas and Scotland. Any differentiation it gains in manufacturing comes from its market orientation. Dell claims the ability to produce ready-to-ship, customized PCs, quantity one, right off the assembly line. That ability alone is meaningless. However, when it is wed to a system of sales order entry that reduces order wait states to practically zero, it becomes a very significant competitive weapon.

Distribution/Customer Service

Dell's shipments are still dominated by its in-house telesales department. Perhaps in response to the projected decline in telesales, Dell has begun in the past 12 months to sell systems through mass merchants, superstores, and consumer electronics stores.

By virtue of its direct sales force, Dell has probably the most complete description of potential customers and prospects of any PC maker. Its concept of "surrounding the customer" and making Dell products easy to buy have been very successful, and key differentiators.

Key Challenges

- Can Dell augment telesales (which may, as a category, be on the way out) with another fast-growing and equally responsive channel?
- Can it maintain its accurate reading of PC buyers' needs and fears even if telesales, the vehicle through which it currently gains the readings, is supplanted by new distribution channels?
- As it grows bigger, more complex, and more like Compaq, can Dell retain its hungry, lean, mean-margin-machine approach while bringing products to market with its current speed?

Gateway 2000

Gateway 2000 is primarily a sales and marketing organization, not a technology company. At the heart of its strategy is the idea that steady attention to the details of bringing products to market and providing solid customer service will pay off in market share. It is evolving toward greater sales and market share, and is less interested in revolutionary products that might catapult it to industry leadership than it is in fine-tuning its development cycles and customer services.

Hardware Features

Innovation at Gateway 2000 is driven by customer demand. The company's standard products and hardware configurations are determined by what their customers want. Then, not only do customers benefit from the economies of scale of building the custom products as standard products (by way of a lower price), but they also get the convenience and service of custom-configured hardware.

While Gateway 2000's primary focus is the customer, the company is quick to point out that it has its share of features leadership. For example, it shipped the DX2 two weeks after Intel announced it, and at a price below that of its competitors.

In addition, Gateway 2000's reliance on customer input steers the company away from some products. It has not built upgradable systems, as have some of its competitors, largely because customers would not, apparently, demand them.

Manufacturing

All desktop systems are assembled in the United States from components purchased offshore. The company feels that the small incremental increases in quality that might accrue from owning component manufacturing do not offset the financial commitment and risk that would be required to build facilities.

Product quality is a potential Achilles heel for Gateway. Because of its large reliance on suppliers for R&D, Gateway does not have the control over quality that other PC makers do. To date, this has not been a problem. It may become one, though.

Distribution/Customer Service

Approximately 50% of the company's business comes from repeat buyers and referrals. A direct telesales department is potential customers' first exposure to Gateway 2000. In time, Gateway's small, focused outbound sales force calls on some of its largest accounts.

Key Challenges

- Can the company stay focused on delivering reliable products quickly?
- Can it continue to grow closer to its customer base by providing top-notch support without incurring excess costs?
- Can Gateway increase the image of its product quality to gain credibility in the corporate market?
- Managing hypergrowth.

Vertical Integration: How Important for PC Makers?

Tomorrow's PC markets will be characterized by a higher degree of end-user segmentation. Specialized chips and systems will be sold for specific applications: spreadsheets, graphics and Windows accelerators, database management, desktop publishers, file servers, and communications to name a few.

The challenge for PC companies today is to identify which value-add model makes most sense in tomorrow's PC markets. One portion of that process involves examining the benefits and drawbacks of vertical integration, up *and* down the value chain.

Ownership of all phases of upstream manufacturing (upstream vertical integration) is generally good for quality and delivery, but it's financially risky. Within the broad standards of the Intel PC market, the benefits that accrue to highly integrated PC companies are incremental advantages in product features. But, incremental product *features* alone are not enough. Unless features can be translated into sales almost immediately (by communicating their *benefits* to customers) they do nothing for the company.

In tomorrow's more specialized PC markets, the ability to translate features into benefits is even more important (because of the frantic turnover of new technology). As a result, upstream-integrated PC companies might be better suited for the new markets. PC companies that focus on assembling (not designing or manufacturing) outsourced components face more of the same: tighter margins, faster product cycles, more complex systems.

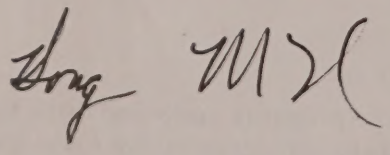
On the other hand are companies integrating in the other direction, downstream. The advantages of proximity to customers are undeniable. Knowing what end users want, and making it easy for customers to buy (downstream vertical integration), are universal ideals.

In tomorrow's specialized markets, gaining tactical information about customers and potential customers is one way of making the sales process more efficient. However, it is still only tactical information. There's an important distinction between *knowing* what function a customer wants to perform (and knowing who she is) and *building* a great product to perform it. The former in no way predisposes the latter.

Which model makes more sense in tomorrow's PC markets? Upstream-integrated suppliers are probably building more of the key competencies than are the downstreamers. No company can ignore the marketing and distribution portions of its business. But owning each portion may not be critical to success.

On the other hand, competitiveness in tomorrow's PC markets will demand the ability to deliver products with rich, specialized features within broad standards. Successful companies will be able to juggle product innovation deftly without stepping over the standards bounds, and then deliver benefits rooted in technical advances. Simply knowing what innovation is required will not, very likely, be enough. Companies need also the ability to deliver it.

PC companies might be drawing a lesson from the old consumer electronics business. RCA used to slap its label on Japanese-built VCRs for sale in the United States. RCA figured that knowing the customers and the local market would enable it to sell the products as if they were RCA's own. It didn't. The only loyalty RCA engendered was with American consumers who mistakenly thought the products were built in the United States. Score one for upstream integrators.



THE GRAY SHEET
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REPORT

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Signs of Life: Software, Networking, and Supercomputer Companies Give a Brighter Outlook to Massachusetts High Tech

Having reached miraculous heights in the 1980s only to sink to dismaying lows more recently, the Massachusetts high-tech community seems remarkably susceptible to the computer industry's cyclical trends. Is it on the verge of a rebound? Consider the following:

- Skilled labor is abundant: since 1989 (the height of the minicomputer boom) approximately 35,000 workers have departed from their high-tech former employers in the computer hardware manufacturing business.

- Skills are focused and leverageable: the former denizens of Route 128 knew how to build computers and networks. Those skills are still valuable, even — particularly — within a new hardware/software paradigm.

- Connectivity stuff is in demand: software and networking services are among the fastest-growing portions of the worldwide computer industry — approximately 15% worldwide. They are growing even faster in the United States.

- University and federal government funding is plentiful: Cambridge is the home of massively parallel computers because of the commercial applicability of federally funded research projects at MIT.

The emergence of a few new companies does not signal a wholesale recovery for the region. Technology businesses — particularly those in the computer industry — are fundamentally cyclical. Great new products are eventually replaced by greater, newer ones. Absent the sensational efficiencies of generational leaps (mini to PC, proprietary silicon to commodity microprocessor) however, the opportunities identified by a majority of the new companies in Massachusetts are incremental in nature.

The companies do, on the other hand, serve to bring to attention some of the region's distinctive high technology capabilities. The activity in three areas — software, networking, and high-performance computing — is injecting life, albeit of moderate proportions, into the local economy, if not offsetting the massive job loss of the past four years.

Growth in distinct pockets of the computer industry is not a panacea for the Massachusetts economy. Continued growth in each area is subject to different sets of enabling conditions and constraints. In this issue of the *Gray Sheet* we examine each of the three sectors of Massachusetts' alive-again high tech industry and profile some of the leading companies in each area.

Software

If any segment of the computer industry can lift Massachusetts out of the doldrums, it is software. The opportunities are immense and growing; entry barriers are scalable. Few breeding grounds can compete with Massachusetts' educational and industrial infrastructure for software companies.

Indeed, the growth of medium-size software companies in Massachusetts has been prolific: between 1986 and 1991 almost a dozen software companies with annual revenue over $10 million were formed. The real excitement is at the low end. Approximately 250 new companies with annual revenues under $10 million were started during the same time frame.

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These new software companies account for thousands of new jobs. The Bank of Boston figures that software employment has been growing steadily between 5% and 15% for the past decade. By 1991, approximately 70,000 software engineers were employed in the state.

Since 1976, the results are even more impressive. Over the past 15 years approximately 500 software companies have been formed in Massachusetts. Some 50 of them have annual revenues over $10 million.

Of the three areas, software continues to hold the greatest promise for Massachusetts. While the actual number of new software companies in the state has declined over the past five years, it remains the fastest-growing portion of the market in terms of real job creation.

Networking and Internetworking

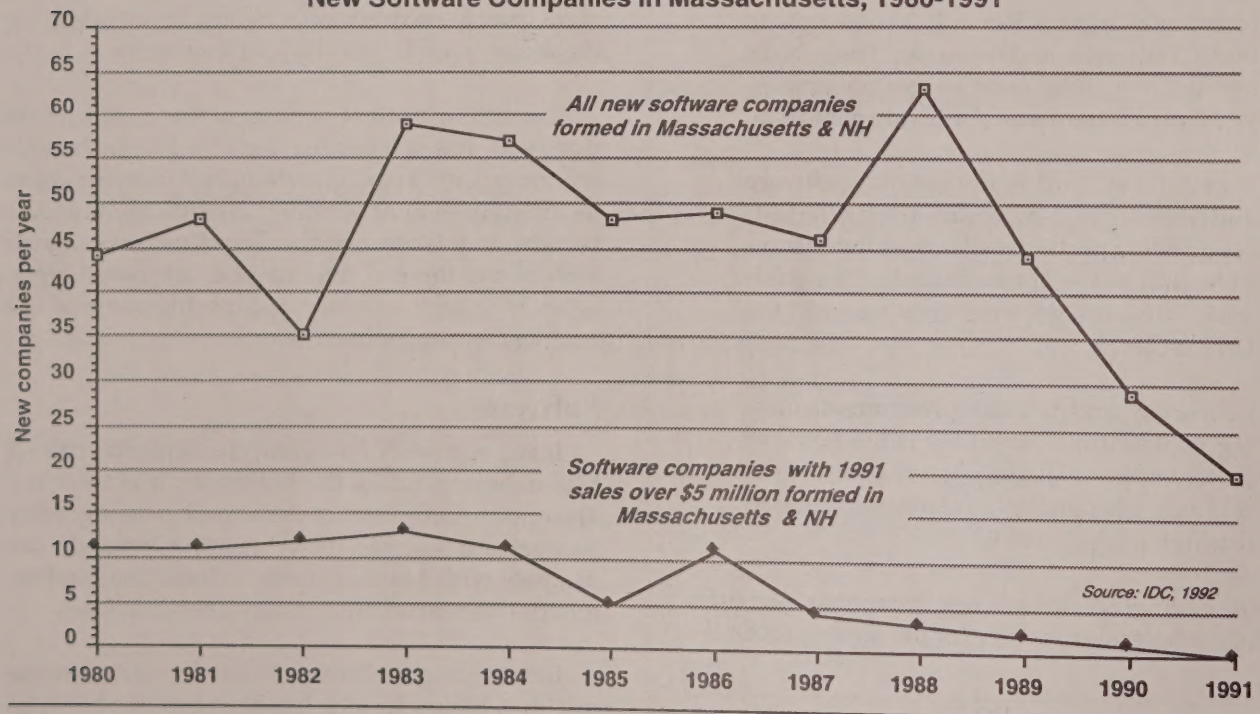
Selling networking products demands an ability to identify markets and to design, construct, and deliver products quickly. Yesterday's hot technology (modems, e.g.) is today's dinosaur. The industry's landscape is littered with companies that could not adapt their technological model to a changed marketplace.

Massachusetts' networking companies are only too aware of this. Take Codex. It was a leader in modems and multiplexers, but was late in jumping on the LAN-centric view of the IS universe. As a result, like DG, Prime, and Wang (which also outlived useful views of the world), it is struggling.

So why are Massachusetts' networking companies now so successful? Companies like Wellfleet and Cisco are thriving because they have adapted to the LAN-centric model of the communication universe more quickly than have their larger rivals.

Does this portend long-term prosperity for local vendors? Hardly. Just as internetworking products displaced traditional datacommunication products like modems and multiplexers, so will internetworking hardware be displaced someday. The real question for long-term prosperity concerns

New Software Companies in Massachusetts, 1980-1991



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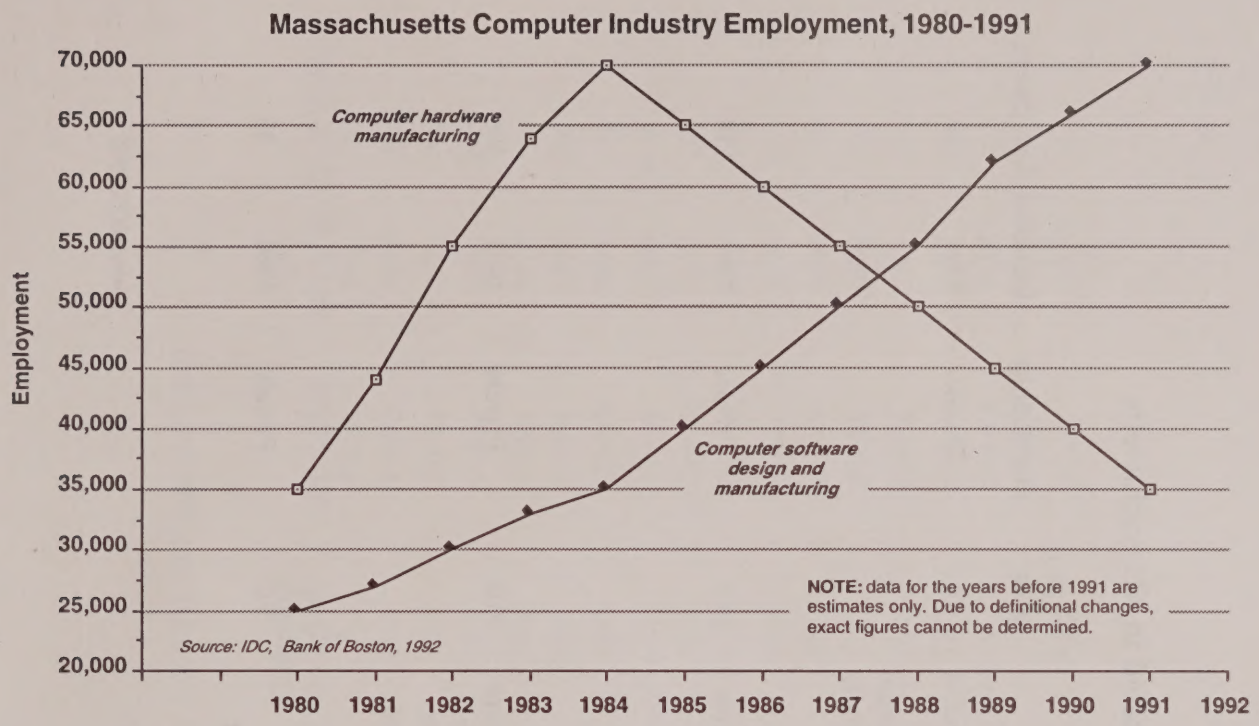


the next generation of products—probably software: What types of algorithms are needed for multiprotocol environments, and who can design them?

Although Massachusetts networking and internetworking companies have been very successful in exploiting the current opportunity, their future prosperity depends on their ability to ramp down as quickly as they ramped up. Identifying which technologies (hardware or software) might supplant today's cash cow products is a critical step toward avoiding the slow, painful demise that has characterized several of the state's former stars.

High-Performance Computing

With federal funding creating a fertile training ground at the state's leading universities for high-performance-minded engineers and PhDs, Massachusetts is well positioned to support research in high-performance computing (HPC). As a result, a handful of parallel-processing computer startups and entrants are located in and around Cambridge, MA. That's the good news.

On the other hand, the market for parallel processing computers is relatively tiny. Massively parallel processing (MPP) computers accounted for approximately 5.1% of the $5.7 billion spent worldwide on high-performance computers in 1991.

Just how much potential does the market hold? The technical segment of the MPP market is expected to grow 25% annually over the next five years. The overall technical HPC market will grow in the single digits to $8.4 billion in 1996. The size of commercial markets for HPC and MPP systems is tiny, but nonetheless remains the subject of much debate. Its potential seems significant, but commercial MPP remains an unknown quantity today.

The net result is that Massachusetts dominates a very small segment of the overall HPC market. Massachusetts-based companies supply 50% of the MPP market through companies like Thinking Machines, Kendall Square Research, Meiko, and Wavetracer.

Employment among these companies will probably continue to grow as the market grows. Because the companies are so small today, the net increases in employment will be relatively minor. Unless major systems manufacturers (from the United States, Japan and Europe) relocate in Massachusetts — a real possibility although no announcements are imminent — the number of people employed by HPC and MPP companies will remain a very small component of overall statewide employment.

From the local perspective, Digital's participation in the nascent MPP market is a wildcard. It currently OEMs MPP systems from Intel and Maspar, and has been making significant investments in MPP software development. Should Digital choose to leverage its considerable assets, it could reinforce the region's status as a hub of HPC and MPP activity.

High Performance Computer Companies Located in Massachusetts

Company	Profile	Company Size	Ownership	Year Founded	Employees
Kendall Square Research Corp.	KSR1 family of scalable systems ranging from $500,000 to over $30 million is focused on business and technical applications, including database and transaction processing. Key strengths: simplified programming environment and applications availability (including Oracle). Weaknesses: late delivery in highly competitive market.	4.0	Public	1986	152
Meiko Corp.	Scalable HPC systems — "the Computing Surface." Aimed at business and technical applications, the systems can incorporate a wide range of microprocessors from different suppliers. Can run all applications that run on Sun workstations, first supplier to ship full-production Oracle. Key strengths: strong European presence, broad price range. Weaknesses: limited marketing/sales, weak U.S. presence.	25.0	Private	1989	16
Thinking Machines	MPP systems start at $1.4 million and can theoretically scale into the tens of millions. Primary market is technical, however, increasing penetration in commercial accounts — American Express and Dow Jones, among others. Key strengths: industry mindshare, strong installed base, OEM to Olivetti. Weaknesses: significant architectural transition, lack of third-party applications, difficult programming environment.	90.0	Private	1983	466
Wavetracer, Inc.	Zephyr series of desktop MPP systems target low end of MPP market, starting at approximately $85,000. Key strengths: defining a new market at the low end, well defined marketing strategy, price leaders. Weaknesses: small, limited access to customers, channels.	5.0	Private	1988	35

Source: IDC, 1992

Leading Networking and Internetworking Companies Located in Massachusetts

Company	Business Segment	Company Size ($M)	Ownership	Year Founded	Employees
Artel Communications	WAN, X.25, fiber hardware	5.6	Public	1981	55
Banyan Systems	VINES: PC network operating system	97.0	Private	1983	600
Bytex	Hubs, matrix switches, control and monitoring equipment	45.0	Public	1980	300
Cabletron	LAN hubs	180.5	Public	1983	2,000
Chipcom	Fiber and broadband fault tolerant hubs, related hardware	48.0	Public	1983	240
Codex	Modems, multiplexers, network management hardware	300.0	Public	1962	2,500
Concord Data	LAN software for MAP	10.0	Private	1981	85
Coral	WAN, bandwidth mgrs.	N/A	Private	1989	N/A
CrossCom Corp.	LAN and WAN bridges and routers	20.0	Private	1987	100
Fibronics International	Fiber optic cables, modems and other equipment	62.0	Public	1977	480
Microcom, Inc.	Modems, LANs and ISDN hardware and software for PCs	54.0	Public	1980	400
Octocom Systems	Modems and network components	35.0	Private	1984	180
PictureTel Corp.	Videoconferencing codecs and related hardware	11.0	Public	1984	307
Proteon, Inc.	Token ring LAN cards, internetworking hardware	95.0	Public	1972	419
Shiva Corp.	LocalTalk modems, bridges	15.0	Private	1985	130
Synernetics	LAN management and apps.	N/A	Private	1988	75
Telco Systems	Photonics, telecommunications equipment and software	90.0	Public	1972	450
Wellfleet Communications	LAN and WAN hardware and software	35.0	Public	1986	290

Source: IDC, 1992

A Cross Section of Massachusetts and New Hampshire Software Companies

Company	Business Segment	Company Size ($M)	Ownership	Founded	Employees
AICorp	Knowledge-based and natural language application development tools	22.6	Public	1975	150
Aries Technology	Mechanical CAE applications	11.0	Private	1984	97
Bachman Inf. Systems	CASE reengineering and application development tools	43.5	Public	1983	154
Cimtelligence Corp.	AI-based CIM applications	7.6	Private	1985	70
Cortex Corp.	CASSE application generator	10.0	Private	1977	84
Dataware Technologies	CD-ROM retrieval and programming applications	5.4	Private	1987	50
Easel Corp.	MS-DOS and OS/2 GUI application development tools	28.4	Public	1981	205
Information Builders	Focus 4GL database applications	191.0	Private	1975	1,600
Information Resources	Financial and sales management applications	167.0	Public	1979	300
Interactive Data	Networking and open systems applications, OS consulting services	60.0	Public	1968	500
Liant Software	Open systems languages and development tools	18.0	Private	1990	168
Lotus Development	Spreadsheets, word processing, E-mail, and groupware applications	685.0	Public	1981	3,500
Marcam Corp.	Manufacturing planning and control, logistics management applications	50.0	Public	1980	500
Medical Info. Tech.	Hospital administration applications	69.0	Public	1969	750
Oasys, Inc.	Object-oriented tools and compilers	3.6	Private	1982	10
Parametric Tech.	Mechanical CAD applications	42.0	Public	1985	350
Pilot Software	Executive information system applications	17.0	Private	1983	350
Progress Software	4GL languages, RDBMS applications and tools	58.3	Public	1981	450
Sigma Design	Unix-based facilities design and management applications	5.1	Private	1981	6
Softbridge Microsystems	Utilities, financial planning, and distribution management applications	10.0	Private	1982	100
Software 2000	Financial, distribution, human resources management applications	3.0	Private	1981	350
Spinnaker Software	Desktop publishing, spreadsheet, and word processing apps. for home use	21.0	Public	1982	130
SQL Solutions, Inc.	RDBMS-based systems integration services	15.0	Public	1986	200
Viewlogic Systems	CAE and design automation tools	42.0	Public	1984	285
XEL Inc.	Compilers, assemblers, interpreters, debuggers, and other tools and utilities	5.0	Private	1982	26
Xyquest, Inc.	Word processing applications	6.2	Private	1982	57

The Older Guard: More Right-Sizing and Retrenching

Massachusetts' oldest minicomputer companies remain in a state of disarray. Digital, Wang, and Data General have recently announced further staff reductions. Prime has announced it is changing its name to Computervision and is selling its hardware business to a group of managers. Among the general systems suppliers only Stratus is stronger now than five years ago. An update on their status:

Data General: Strong Aviion sales (doubling to $200 million last year) have not been enough to offset sales of MVs, which have been dropping by approximately 25% annually. As a result, DG is back to cost cutting, although it claims that neither development nor marketing staff have been pared this time. DG will employ just over 7,000 workers after the cuts, down from a peak of over 17,000 in 1985. In addition, the future of the Motorola 88000 chip at the heart of the Aviion could be in doubt. Because DG is Motorola's largest customer and the only major systems company to build a line around the chip, Motorola may be disinclined to fund the upgrades required to keep the chip competitive, particularly in light of its announced agreement with IBM and Apple to manufacture the POWER series RISC chips.

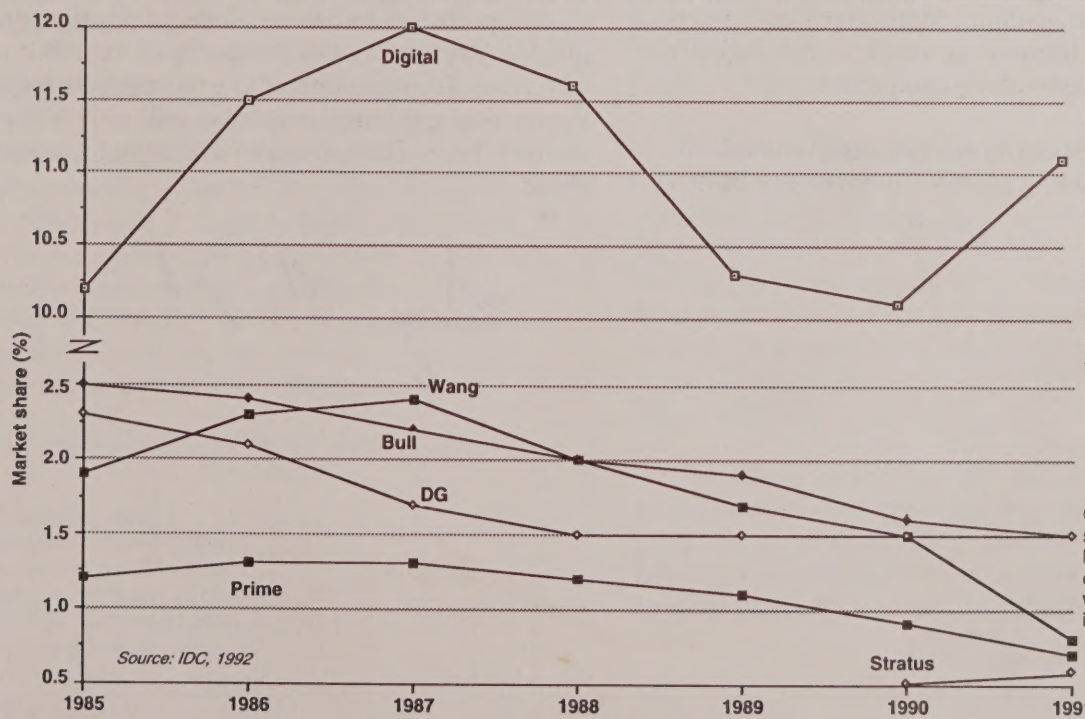
Prime: With a strong product suite, strategy, and organization, Computervision, the "new" name for the software portion of Prime/CV, is well positioned to build upon its success in the mechanical CAD market. The company plans a low-end thrust (through VARs) to expand on its 22% share (approximately $750 million) of the market. Prospects for the hardware business are less sanguine. One particularly ironic note: MAI had offered $600 million for Prime's hardware business three years ago (after Prime agreed to the J.H. Whitney buyout). Prime now plans to sell off most of the business for less than one-tenth of that price.

Wang: The jury is still out on Wang CEO Richard Miller's about-face strategy to transform Wang into a software, systems integration, and services company. While Wang reported another losing quarter last month, and another 1,000 layoffs, the shift to a new business model will take time, more than just another quarter. The key component of Wang's plan: not just delivering the announced imaging products, but executing on a broader, services-oriented business strategy built around the new products.

Stratus: Stratus Computer is steadily increasing revenue, earnings and employment (capturing almost 22% of the U.S. fault-tolerant market in 1991) with a conservative strategy aimed at supplying systems to the low end of the fault-tolerant niche. The company continues to make inroads against Tandem. Despite its considerable successes, Stratus still faces formidable challenges. While competitors such as HP have promoted RISC-based high-availability systems aggressively, only 15% of Stratus's 1991 product revenue was derived from RISC-based systems. Stratus draws on two distinctive strength: its product line has always been microprocessor based (unlike those of its major competitors), and its list of OEM customers (which includes Ericsson, IBM, ICL, Olivetti, and NEC, among others) is impressive.

U.S. Multiuser Hardware Market Share ($) of Massachusetts-Based Systems Suppliers, 1985-1991

PCs and microprocessor-based systems and servers have been eating away at traditional multiuser systems markets since the early 1980s. Further, Massachusetts systems companies have been suffering loss of market share even within their traditional markets.



Digital's share of the multiuser system market increased last year thanks to dismal results industrywide, most notably a 17% drop (1990-1991) in the value of mainframes shipped in the United States. Preliminary results from the first months of this year indicate Digital's downward trend will continue in 1992.

Other Mass.-based suppliers continue to lose market share, except Stratus, whose share is slowly increasing.

Miracles Don't Happen Overnight

The recent groundswell of activity in the Massachusetts computer industry has been called a lot of things: the "second coming" and "too little too late," among others. Neither is thoroughly accurate.

The term "Massachusetts Miracle" that was used to describe the return of the state to economic competitiveness in the mid-1980s never rang very true. It was simplistic (was the state so ill that it required divine intervention?), misleading (allowing politicians to take credit for the state's prosperity), and distracting (self-congratulation is another chance to avoid reality: the state took its eyes off the ball). Miracle rings no truer now.

Conversely, to discount the excitement and potential in the local industry is shortsighted. The need for networking hardware, software and expertise will only keep growing. Software is the plastic of the 1990s and beyond. Massive parallelism may be the architecture of the next wave of computing.

Because Massachusetts is rightly wary of misleading labels, however, it is easy to overlook the incredible wealth of activity bubbling deep within the state's computer industry today. As a result, there is a tendency to disregard the importance of some of the region's most enviable fundamental characteristics: a higher-than-average concentration of government R&D money, the brightest students of the next generation, incredible academic institutions, and a network of proven training grounds in the region's established high technology companies.

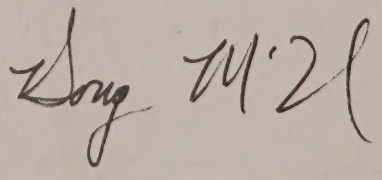
These resources can hardly be overestimated. But they are only building blocks. To have once built a group of thriving businesses out of those blocks is a terrific achievement. If employers within the State of Massachusetts learn anything from the experience of the past few years it is the necessity to continually reexamine how the blocks can be thrown again together into a more efficient shape, despite the pain and chaos of the change.

It's equally important to remember that miracles don't happen overnight. Companies that drove Massachusetts' 1980s prosperity were formed in the 1960s. Companies that formed the bedrock for Silicon Valley's expansion were formed before then. In each case, the growth of a boom cycle took much longer than a year or two.

What's more, those boom periods took place when the computer industry had lots of headroom into which to grow. With slower growth now, it's important to consider the current activity in terms of decades, not years.

Companies like Thinking Machines and KSR are like seeds that may someday grow into towering trees. To give them extra light, fertilizer and water today may eventually help them grow heartier limbs and bigger leaves. But what they really need to get started is time. No extra waterings or sunlight can accelerate their growth.

Prosperity is a lot easier to lose quickly than grow quickly. Replicating the prosperity of the 1980s will take years. To expect immediate returns from today's young and growing companies will only serve to distract them. They already have enough to worry about.



THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR | JUNE 26, 1992 • VOL. 27, NO. 17 | Published continuously since 1964.

Narrowing the Gap Between Japan IS and U.S., European Sites

In 1992, the Japan information technology (IT) market stands at the threshold of a new era of chastened expectations and changing dynamics.

The new pressures on the Japanese IT market have already begun to erase some of the historic differences between IT spending in Japan and in other mature economies. Consider the following:

- Last year, for the first time in years, the market did not expand in double digits. IDC preliminary estimates indicate that it grew only 6% in 1991, better than the U.S. at 4% or Western Europe at 3%, but considerably below historic rates.

- Two outside measuring sticks suggest that these overall lower rates will continue through the next half decade at least. First, the economy: in 1991, Japan's GNP grew only 3.7%. Expansion in 1992 is expected to dip below 3%, while through 1995 it should hover in the 3-4% range. And second, common sense: double-digit growth never continues forever.

- Japanese users are proving less willing to invest in new computer systems than in the past, but the growth in their spending on software and services has declined hardly at all. After years of lagging behind the proportions registered elsewhere, software and services accounted for nearly 48% of the Japanese IT market in 1991. One reason for this shift has been the decision of many system vendors to unbundle products and services (e.g., maintenance) that had previously been included in hardware pricing. With hardware spending down, vendors must recoup revenue where they can.

Indeed, the attitudes of Japanese users represent the most intriguing element in the new environment. For years, they have allowed the Japanese IT market to develop unique patterns setting it apart from the U.S. and European models.

No other major market, for example, has proven so loyal to mainframes, or so resistant to desktop systems; no other major market has shown less interest in Unix, in packaged software, or in PC LANs.

In addition, Japanese users are far more conservative in their general IT outlook. They are less likely to adopt new technologies than their counterparts in the United States and Europe.

Are these attitudes changing? Beyond simply determining short-term spending plans in 1992, the key issue for the Japan IT market is the overall strategic thrust of customer decisions.

To address both the short-term and long-term issues, IDC has extended its 1992 IT Customer Directions and Spending Strategies user survey project to Japan. Conforming with IDC's worldwide 1992 IT survey, the Japan survey posed a series of questions to almost 1,400 Japanese sites in February 1992. For a complete discussion of the methodology of IDC's 1992 IT surveys, see the *Gray Sheet* 27: 9 (February 28, 1992), page 7.

The survey focused on the sites' overall IS environment and on its strategy for implementing new technologies. Two key indicators of IT spending — host environment and vertical market — were examined for their effect on users' attitudes.

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IDC INTERNATIONAL DATA CORPORATION
5 Speen Street, Framingham, MA 01701 / (508) 872-8200

The IS Environment

The key areas of focus are the major challenges for 1992: attitudes towards IS change, acceptance of new technologies, and 1992 spending priorities.

Most important challenge for 1992: As in the United States, migration to more modern platforms was most often chosen as the primary IS challenge in 1992. This issue is especially important to mini and small business computer users. The Japan survey base differed by the low emphasis on cost control and the very high proportion citing staff issues (only 3% in the U.S. chose this option).

Attitudes towards IS change: The Japanese users portray themselves as significantly more conservative than their U.S. counterparts, a quarter of whom chose the "often adopt new technologies" option and only 11% of whom stated that they rarely make more than marginal improvements. In Japan the results were diametrically opposed. NEC 3100 sites proved especially unadventurous. Business services sites in Japan proved atypically adventurous.

Acceptance of new technologies: Workstations are by far the most popular new technology, followed by image processing and object-oriented databases or languages. EDI is far less attractive than in the United States.

There is a very wide swing from the high point (IBM and PCM S/370 and S/390 sites) to the low (NEC 3100), but most host environments clustered near the mean. Among the vertical markets, there is an equally wide swing from the high point (business services) to the low (finance).

Current spending priorities: Almost a third of the budget-weighted responses reported expectations of heavy investments in both hardware and software, while another quarter anticipated an emphasis on software and services. Only 7% expected to focus on hardware rather than software.

That left 37% expecting stasis or contraction. IBM/PCM S/370 and S/390 sites and Hitachi mainframe environments are the most optimistic. In general, vertical market groupings did not stray too far from the survey mean.

Technology Implementation

This section attempts to gauge users' centralization of control and resources and their willingness to implement new IS paradigms such as client/server computing, an open systems or Unix-oriented strategy, outsourcing, and systems integration.

Current management control: In general, the bigger the host system, the higher the degree of central control becomes. However, overall control is much lower in Japan than in the United States. The "fully centralized" average in Japan was just over 30%, compared with 58% in the United States. The respective overall averages for no centralization were 37% and 15%.

The biggest differences between the two countries were in central management of LANs or departmental systems and of telecommunications. Users in the U.S. were much more likely to centralize control of the former, users in Japan to centralize management of the latter. In other words, users will centralize what is central to their overall activity.

Centralized vs. distributed resources: Despite the historic emphasis on mainframes in Japan, downsizing is making serious inroads. Over a third of the base is moving major applications onto smaller, distributed systems or focusing new applications development on distributed systems. Moreover, these proportions parallel the results in the U.S., the fountainhead of distributed computing.

Client/server computing: A far lower proportion of the survey base in Japan is moving or has moved to client/server computing than in the United States (6% compared to 22%). However, while users in Japan are in general somewhat more negative towards the subject than their U.S. counterparts, the discrepancy is manageable for vendors pushing the client/server approach.

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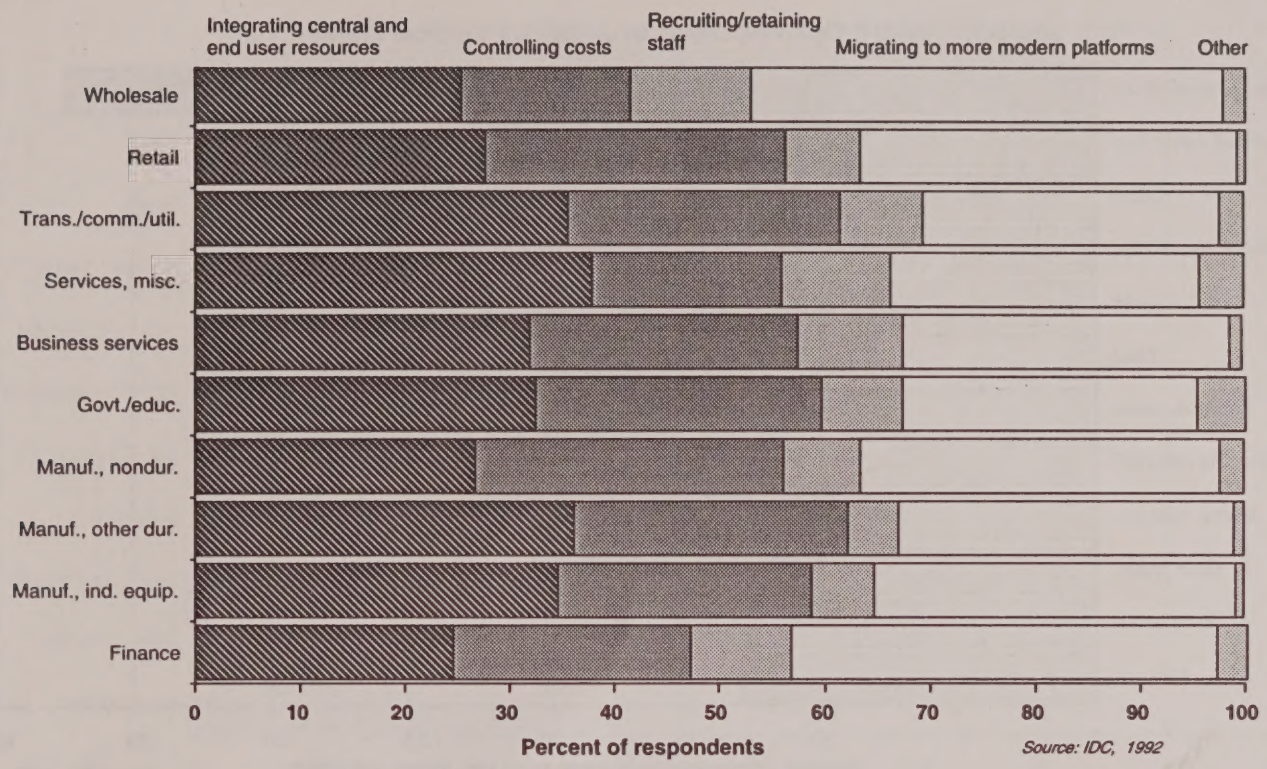
Major IS Challenges in Japan by Vertical Market, 1992



To better examine the data, the three broadly positive responses to the client/server paradigm are grouped together and contrasted with the two broadly negative options. The average 40% positive reaction does not fall seriously short of the 49% positive vote by the U.S. survey base. Once again, IBM/PCM S/370 and S/390 sites are the most enthusiastic, and NEC 3100 environments by far the least convinced. Finance is the most negative towards a new technology, followed by wholesale.

The education task confronting vendors is underscored by the quarter of the Japan base that would like to move to the client/server approach, but is unsure how. On the plus side, the extremely negative reaction dismissing client/server computing as a "buzzword" is no higher in Japan than in the United States.

Open systems: Only a quarter of the Japan base stated that they were pursuing an open systems strategy, in contrast to half of the U.S. base. However, the means of implementing such a strategy were broadly congruent.

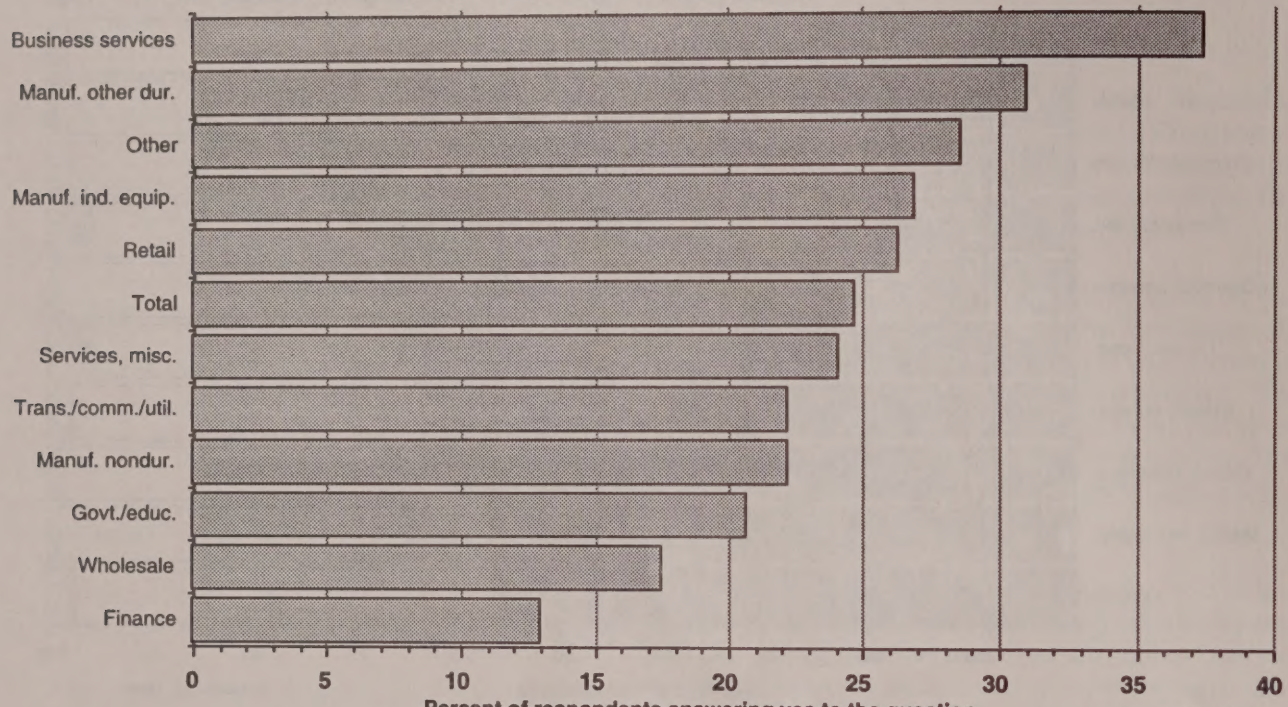
Unix: The proportions actively pursuing a Unix option are much smaller in Japan than in the U.S. (12.5%, compared to 30%). However, the percentage considering a Unix-oriented strategy is much higher. Added together, the potential markets are almost comparable as ratios of the two survey bases: 33% in Japan vs. 37% in the United States.

Outsourcing: Considering the significance of the outsourcing decision for IS managers, the 9% currently outsourcing in the Japan base is high, while the 23% pursuing or considering the option is strong testimony about the pressures on users in Japan. The ratios are particularly high at IBM and PCM S/370 and S/390 sites. And, for once, the positive ratio is particularly high in finance.

Systems integration: As with the responses on outsourcing, the reactions to systems integration in the Japan survey base suggested the difficulty and complexity of the issues confronting users today. The 23% of the Japan base pursuing or considering systems integration parallels the U.S. results.

However, at sites with no current interest in systems integration, users in Japan were much more likely to be satisfied with existing resources and services. It is significant that the current and potential demand for systems integration services is fairly evenly spread across all industry groups in the survey base.

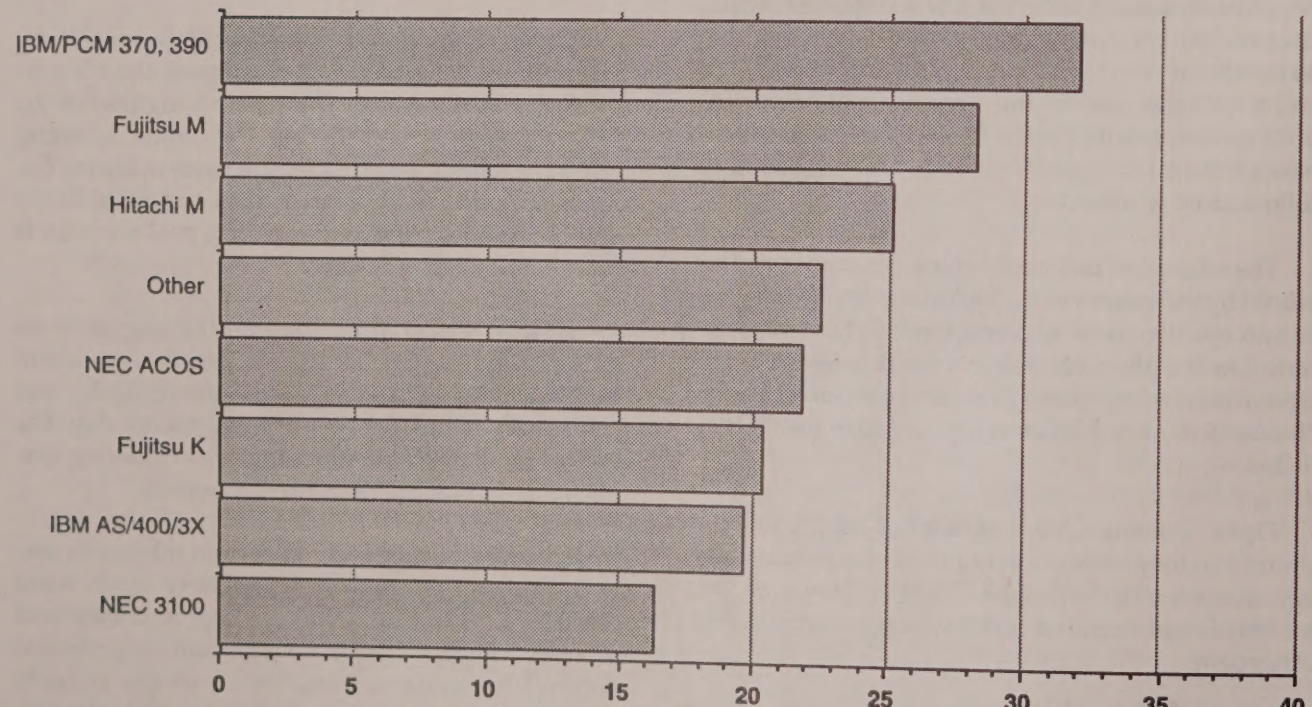
Attitude Toward Open Systems in Japan by Vertical Market, 1992



Percent of respondents answering yes to the question:
"Are you pursuing an open systems strategy?"

Source: IDC, 1992

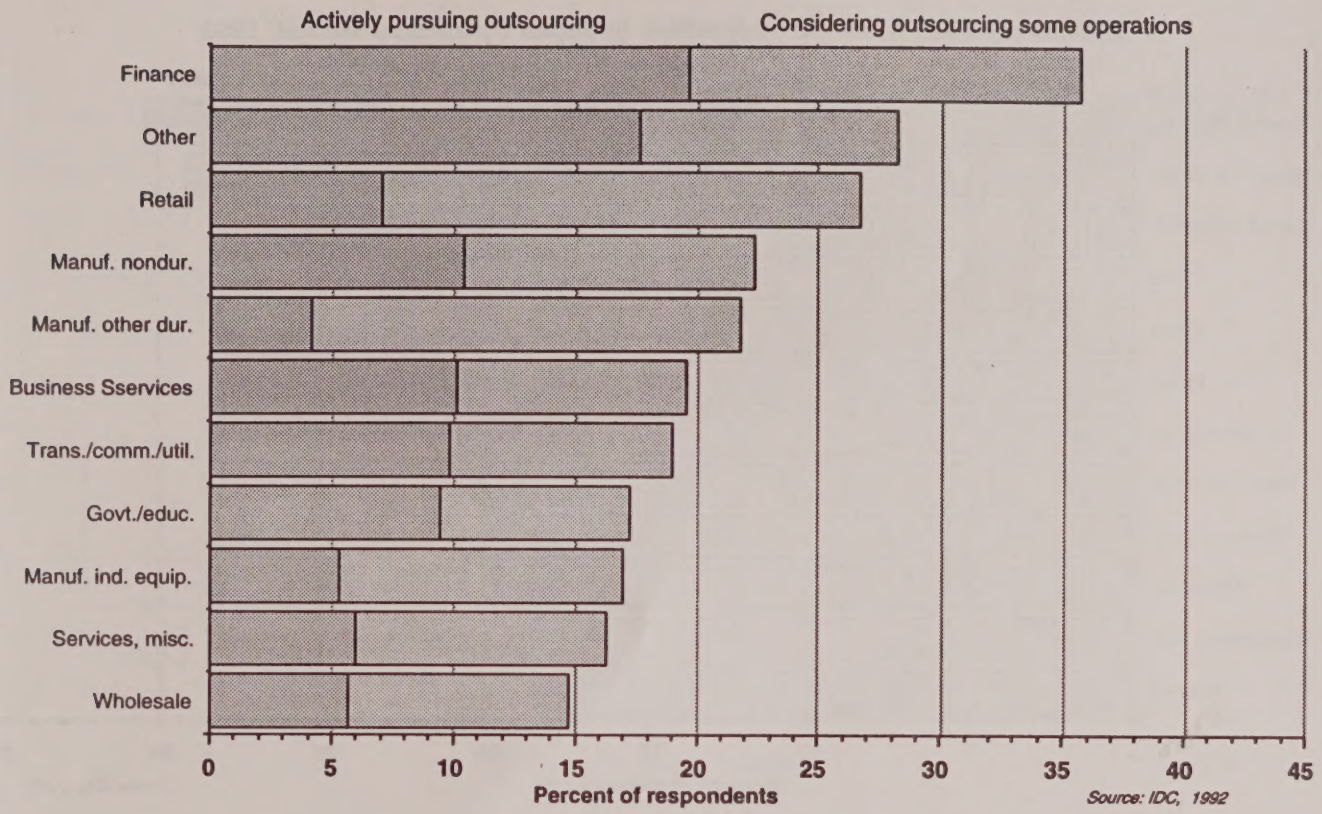
Attitude Toward Open Systems in Japan by Host, 1992



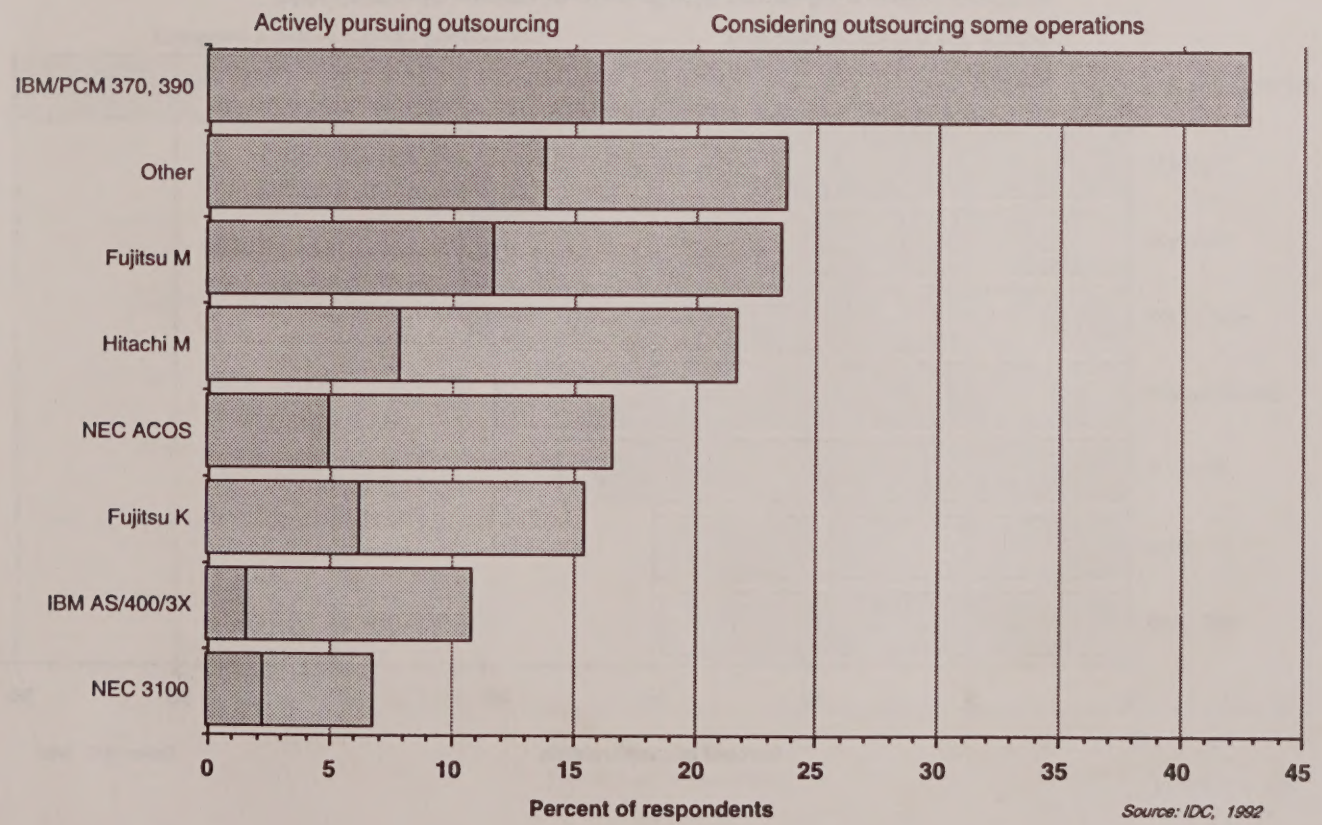
Percent of respondents answering yes to the question:
"Are you pursuing an open systems strategy?"

Source: IDC, 1992

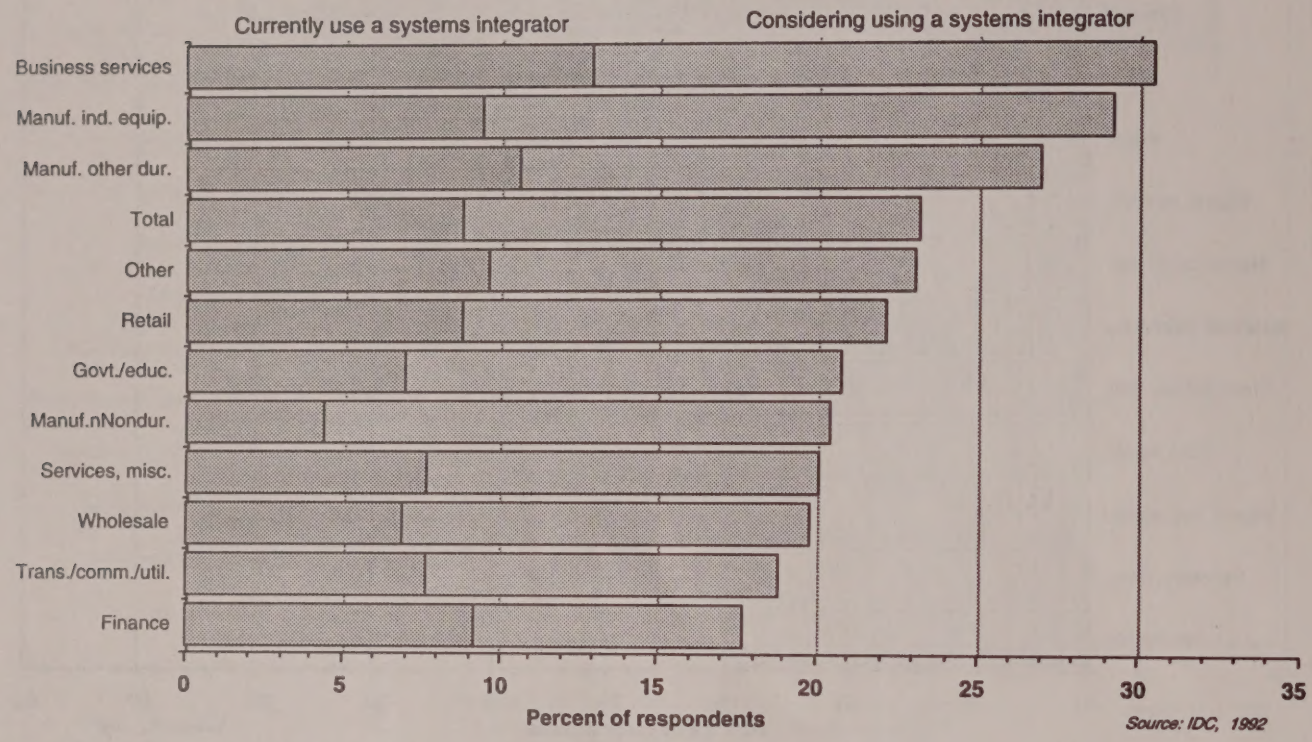
Attitude Toward Outsourcing in Japan by Vertical Market, 1992



Attitude Toward Outsourcing in Japan by Host, 1992



Attitude Toward Systems Integration in Japan by Vertical Market, 1992



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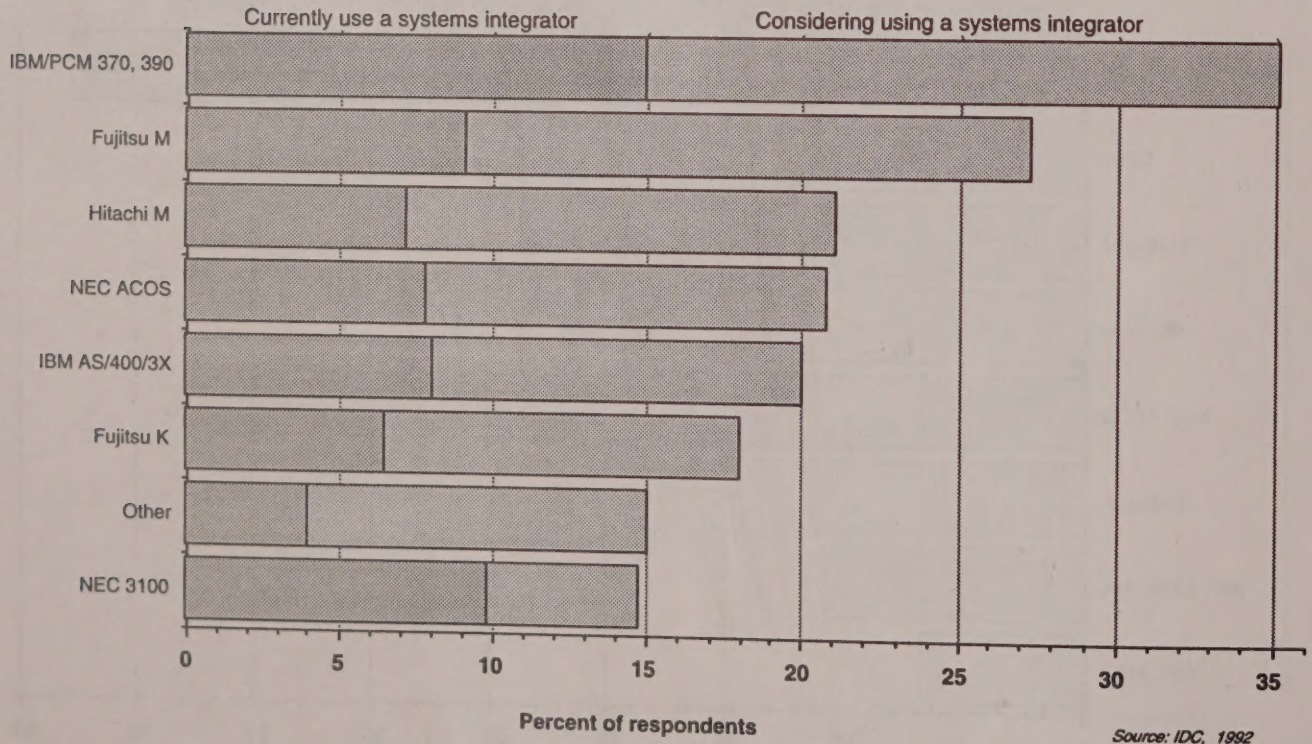
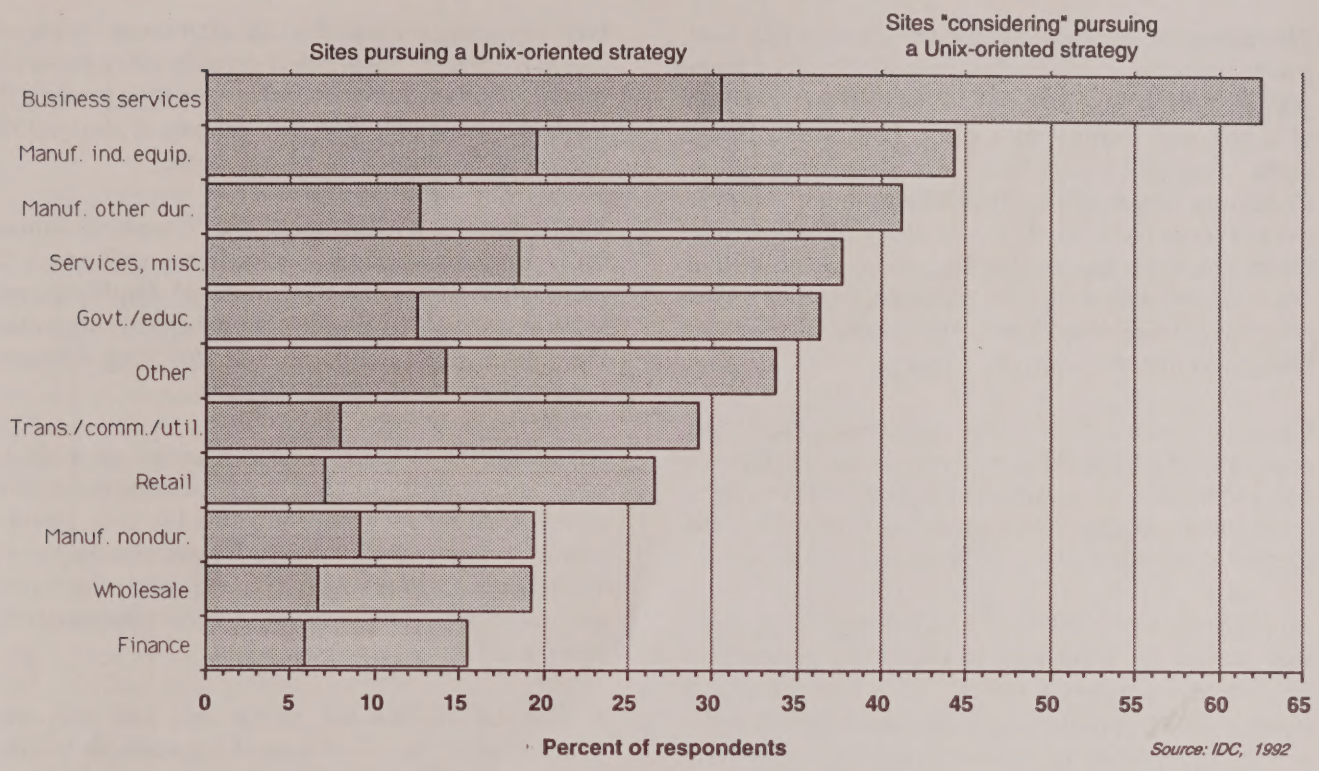


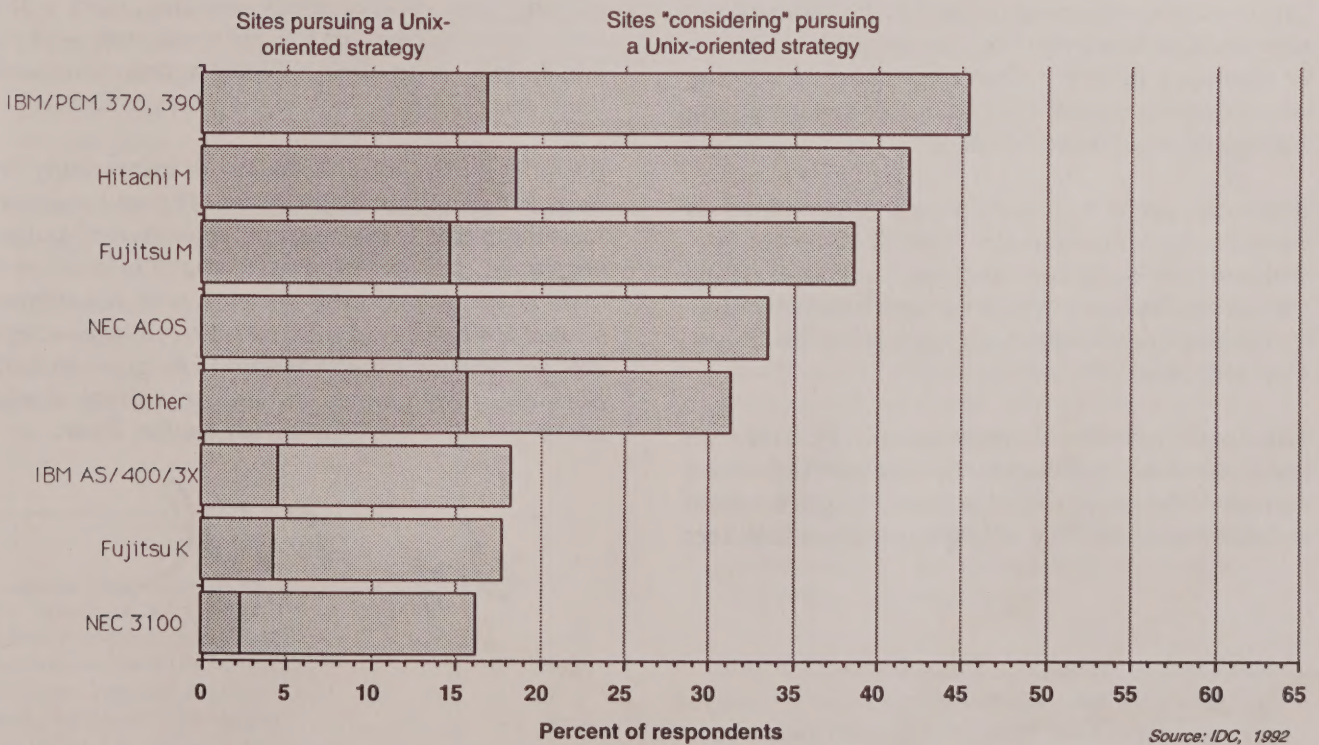
Source: IDC, 1992

Attitude Toward Unix Strategy in Japan by Vertical Market, 1992



Source: IDC, 1992

Attitude Toward Unix Strategy in Japan by Host, 1992



Source: IDC, 1992

The Great Debate: Does the United States Need a Technology Policy?

The domestic computer industry's loss of jobs and production capacity to offshore suppliers has been punctuated by the resurfaced discussions on the merits of a national technology policy. Last week, IDC's sister company *Computerworld* and software giant Computer Associates sponsored a forum to examine the potential benefits of a technology policy. It may be time for the computer industry to raise it collective voice to help ensure that any technology policy that is adopted neither actually stifles innovation nor wastes huge amounts of taxpayers' money.

Can govermental intervention help companies in the computer industries? Depends who you ask. Japan's MITI was very successful in helping that country's steel and consumer electronics industries. Its Fifth Generation project was, on the other hand, a bomb.

The U.S. government's (and U.S. companies') less-than-stellar track records in industrial policy and cooperative consortia (MCC, US Memories, and George Bush's January Japan Embarassment), indicate the U.S. computer industry might be best served by flat-out capitalism. If companies can't keep up, tough luck. However, the mere difficulty of orchestrating a successful technology policy should not be reason enough to avoid doing it.

Creating an environment in the U.S. that's conducive to innovation is essential for the future of the domestic computer industry. That does not mean saying what companies must do, but it does mean helping them get into a position to decide.

If we *can* agree that such a technology policy is desirable, how do we make it work? Layers of government panels and commissions, forms, and arcane criteria are likely to increase the time in which industry can respond to ever-changing market conditions. That's no help.

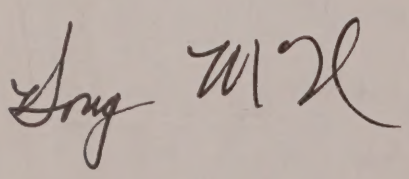
To help, the government must act quickly. And even fast action doesn't always work. Last year U.S.-based makers of flat-panel displays asked the government to intervene when they felt Japanese manufacturers were shipping units to the U.S. at or lower than cost. The government responded quickly all right — too quickly. Rather than talk to the country's leading PC makers like Apple, IBM, or Compaq, it slapped the incoming displays with a huge tariff.

The net result was disastrous. The PC makers stopped importing the displays, because they shifted all PC production (that used the flat-panel displays) overseas. Instead of helping the domestic display industry, government action shifted fledgling domestic notebook manufacturing offshore.

An industry policy can be composed of a dozen different proactive elements: investment tax credits, direct R&D funding, capital gains tax cuts, government-funded joint ventures and consortia. Some will work here, and some won't. To maximize the former and avoid the latter, we offer two basic (fundamental, even) guidelines to policymakers:

A SINGULAR FOCUS: Solve one, and only one, problem at a time. Politicians abhor a simple bill that isolates a problem, then fixes it. They prefer to attach riders, amendments and adjustments that advance their own (often politically motivated) agenda. The result is a mish mash of mediocrity. We don't have time for that. Fix one problem at a time. Just do it, and nothing else. To spur R&D spending, offer a 15% investment tax credit on R&D expenditures — in one bill, by itself. When that problem has been addressed, then, and only then, look to the next problem.

INVEST IN PEOPLE: Software is increasingly the basis for competitive advantage. The raw materials for building software are bright, capable, well-trained engineers. Any American who wants to study software engineering in this country, who has demonstrated ability to study it, and who can meet acceptable proficiency standards should be given that opportunity. Give parents and legal guardians of engineering students full tuition tax credits. Now.



THE GRAY SHEET
MAINFRAME REVIEW AND FORECAST
Computer Industry REPORT

DOUG McLEOD, EDITOR | JULY 17, 1992 • VOL. 27, NO. 18 | Published continuously since 1964.

Big Iron's Time-Tested Advantages Not Enough to Prevent Mainframe Malaise

The current condition of mainframe suppliers IBM, Amdahl, and Unisys has raised more flags heralding the end of the mainframe business. Their woes evidence a fundamental weakness in mainframe-based solutions. Compared to alternative technologies, mainframes cost too much and in many cases (except high volume, transaction-oriented database applications) they don't do enough.

But before calling the orderlies, remember that some organizations will never replace mainframes with distributed computers. Some mainframe segments continue to outgrow the worldwide computer industry. While the following factors don't quite offset the general exodus away from mainframe-based solutions, they offer mainline mainframe suppliers some solace, and suppliers of distributed systems some sobering targets:

- The cost of migrating from mainframes to other platforms remains a substantial barrier to downsizing. The price of rewriting applications and reshaping MIS and end-user organizations can be huge. In some cases, the benefits are not felt at the bottom line for years.

- Mainframe-based solutions set two standards: performance and organizational. Mainframe performance has been surpassed loudly and happily by a host of distributed and networked computing topologies. No matter how much faster networked solutions go, though, they do not address the fact that a hierarchical structure is more effective in some organizations. For the most part those organizations remain mainframe buyers.

- Someday distributed computing alternatives to mainframes will offer the level of security mainframes provide today. When they do, a new segment of mainframe buyers will downsize away from mainframes. Until they do, mainframe suppliers will exploit one of the few remaining advantages they enjoy.

- During the past decade of PC frenzy, acquisition and resource management costs shifted from central IS to individual business units. During the last two years of economic stagnation, organizations have undertaken enterprisewide belt-tightening and budget-trimming. One question that has emerged from those exercises: Mightn't this decentralization be better managed from a central location? Mainframe-based IS management solutions like systems managed storage, resource allocation and change management are increasingly important mainframe applications. In some cases, they will become the mainframe's sole raison d'etre.

- Mainframe customers have grown accustomed to a certain level of performance predictability. Mainframes are a very stable environment where response times and processing rates are well known. Many of the products that have stolen mainframes' thunder provide less-than-desirable predictability. Mainframe suppliers will continue to exploit this advantage, particularly with customers that are exceptionally averse to response-time surprises.

Mainframes will not disappear from the IT marketplace until suppliers of alternative technology solutions address these types of issues. Is that enough

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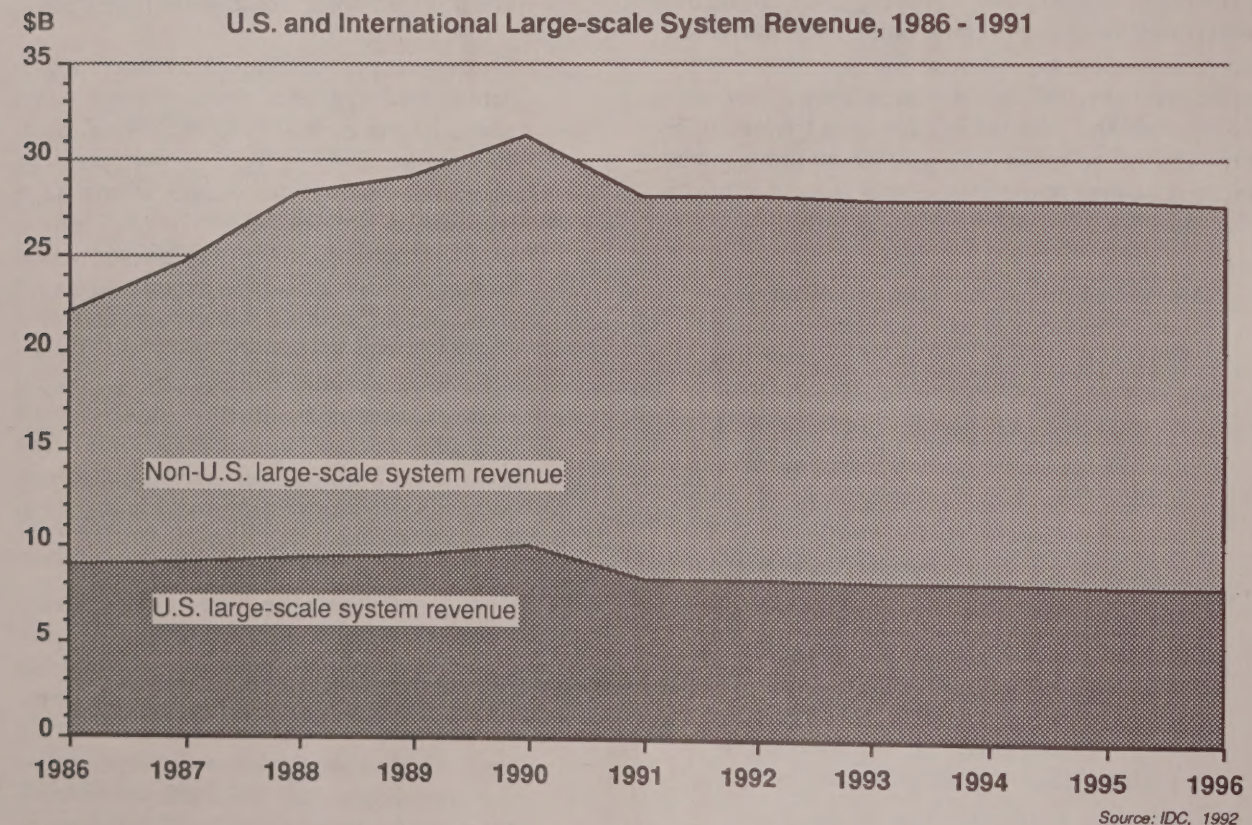
to sustain the current surfeit of mainframe companies? So far, no. Over the past two years such arguments justifying the mainframe have only fleetingly translated to market opportunities.

As a result, in 1991 worldwide mainframe system revenue declined 9.7% from 1990 levels. It declined 17.3% in the United States. Japan was the only region where mainframe spending actually increased. Among the top five worldwide mainframe suppliers, only Fujitsu and Hitachi grew system revenue over 1990 levels.

Wicked price cutting was rampant because suppliers realized some revenue was better than none. Even IBM was swept up in price cutting. Increased competition from plug-compatible manufacturers (PCMs) for mainframe storage subsystems forced IBM into uncharacteristic storage discounting.

Will 1992 be any better? Probably a little. It can't get much worse. The mainframe industry will remain in a phase of decreasing spending for at least the near term. Worldwide 1992 growth will slouch along in the 0-2% range. The trend toward fewer, larger mainframe sites, already well underway, will continue.

Over the next five years, International Data Corporation, publisher of the *Gray Sheet*, expects worldwide mainframe revenue will decline slowly. As a result, the installed base of mainframes will continue to decline, and will do so more quickly than ever.



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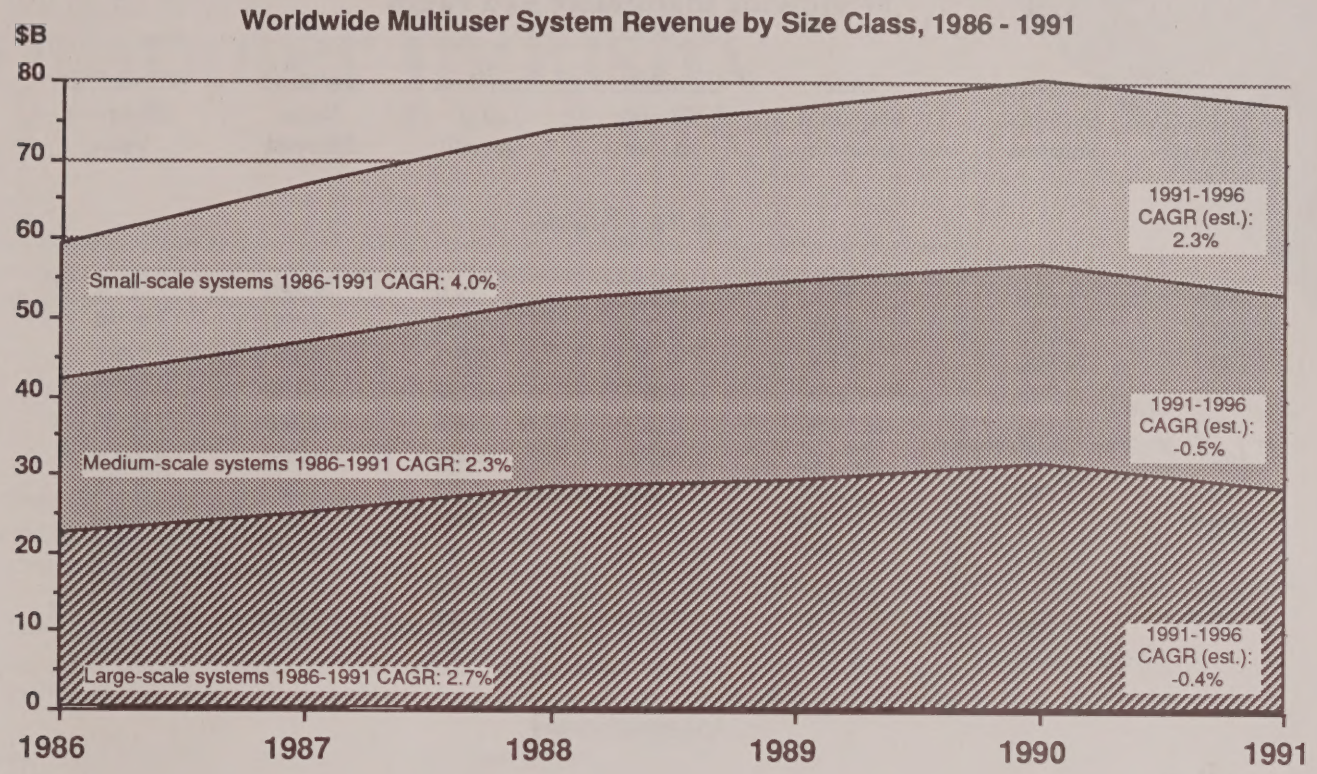

Source: IDC, 1992

IBM Strategy Update: S/390 as the Ultimate Server

It's no secret that IBM's computing strategy for the past two decades has been centered around the mainframe. It's also no secret that that strategy wouldn't last forever. Nonetheless, while IBM's top management has been experiencing an increasing tolerance of PCs, the core view has remained unchanged since 1970.

A perceptible shift in IBM's vision of the mainframe is driving a new strategy within IBM and, IBM hopes, its customer base. At the core of the new strategy are a slew of management products that put muscle behind the information warehouse and are meant to keep the mainframe — IBM's mainframe — at the pinnacle of the corporate computing resource. It is a relatively new vision. At the time of the ES/9000 announcement not even 24 months ago, strong factions within IBM adhered to the old view.

IBM's first strategy for PCs was straightforward: integrate them into the mainframe environment. Now it's the other way around: integrate the mainframe environment onto the desktop. The long-term viability of IBM's mainframe business will be highly correlated with its success selling such products as SystemView and DFDSM.

SystemView

In MIS, like most armies, command, control and organization happens from the top down. SystemView is IBM's answer. It is a set of products and specifications that utilize the mainframe as the linchpin of control of an enterprise's computing resources. It is also an increasingly important strategic application for IBM, particularly vis a vis lower-cost, distributed solutions.

SystemView partners, including Candle, Legent/Goal and others, are building SystemView-compliant products that will allow customers better control, efficiency, and productivity of mainframe environments. They are the building blocks that form the foundation of the mainframe as information warehouse and as enterprise server.

DFDSM

IBM's Data Facility Distributed Storage Manager (DFDSM) is a client/server storage management product that allows storage management and data access services across the following environments: OS/2, AIX, DOS, SunOS, Apple System 6 or 7, Windows 3.0, and Novell Netware. DFDSM organizes control for networkwide backup and data management practices at the mainframe.

With DFDSM IBM customers can employ a centrally-managed backup strategy for file servers and workstations. In addition, it allows customers to utilize storage resources more efficiently by making application data available across remote systems.

Worldwide Mainframe Red Pages

Year	Number of Systems Shipped	Unit Shipment Growth	Cumulative Number in Use	Installed Base Growth	$ Million Value Shipped	Growth in Shipment Value
United States						
1986	1,690	NA	11,910	NA	8,880	NA
1987	1,680	-0.6%	11,710	-1.7%	9,070	2.1%
1988	1,520	-9.5%	11,300	-3.5%	9,330	2.9%
1989	1,390	-8.6%	10,870	-3.8%	9,420	1.0%
1990	1,148	-17.4%	10,500	-3.4%	9,940	5.5%
1991	1,030	-10.3%	9,727	-7.4%	8,220	-17.3%
1992	1,044	1.3%	8,899	-8.5%	8,320	1.2%
1993	1,052	0.8%	8,282	-6.9%	8,170	-1.8%
1994	1,060	0.8%	7,735	-6.6%	8,070	-1.2%
1995	1,070	0.9%	7,314	-5.4%	8,010	-0.7%
1996	1,060	-0.9%	7,022	-4.0%	7,960	-0.6%
	91-96 CAGR	0.6%		-6.3%		-0.6%
International						
1986	2,531	NA	11,170	NA	13,140	NA
1987	2,780	9.8%	12,610	12.9%	15,590	18.6%
1988	2,860	2.9%	14,580	15.6%	18,900	21.2%
1989	2,930	2.4%	15,550	6.7%	19,630	3.9%
1990	2,467	-15.8%	16,033	3.1%	21,210	8.0%
1991	2,230	-9.6%	16,048	0.1%	19,895	-6.2%
1992	2,325	4.3%	16,045	0.0%	19,675	-1.1%
1993	2,348	1.0%	15,902	-0.9%	19,675	0.0%
1994	2,303	-1.9%	15,572	-2.1%	19,710	0.2%
1995	2,303	0.0%	15,214	-2.3%	19,720	0.1%
1996	2,320	0.8%	14,929	-1.9%	19,620	-0.5%
	91-96 CAGR	0.8%		-1.4%		-0.3%
Worldwide						
1986	4,221	NA	23,080	NA	22,020	NA
1987	4,460	5.7%	24,320	5.4%	24,660	12.0%
1988	4,380	-1.8%	25,880	6.4%	28,230	14.5%
1989	4,320	-1.4%	26,420	2.1%	29,050	2.9%
1990	3,615	-16.3%	26,533	0.4%	31,150	7.2%
1991	3,260	-9.8%	25,775	-2.9%	28,115	-9.7%
1992	3,369	3.3%	24,944	-3.2%	27,995	-0.4%
1993	3,400	0.9%	24,184	-3.0%	27,845	-0.5%
1994	3,363	-1.1%	23,307	-3.6%	27,780	-0.2%
1995	3,373	0.3%	22,528	-3.3%	27,730	-0.2%
1996	3,380	0.2%	21,951	-2.6%	27,580	-0.5%
	91-96 CAGR	0.7%		-3.2%		-0.4%

Source: IDC, 1992

THE GRAY SHEET

Computer Industry REPORT

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Storage Review and Forecast (27:3) • WW OEM Winchester market shares, forecasts by form factor, capacity • DASD will not be enough to save IBM in 1991, also: market share	_____	$45	_____
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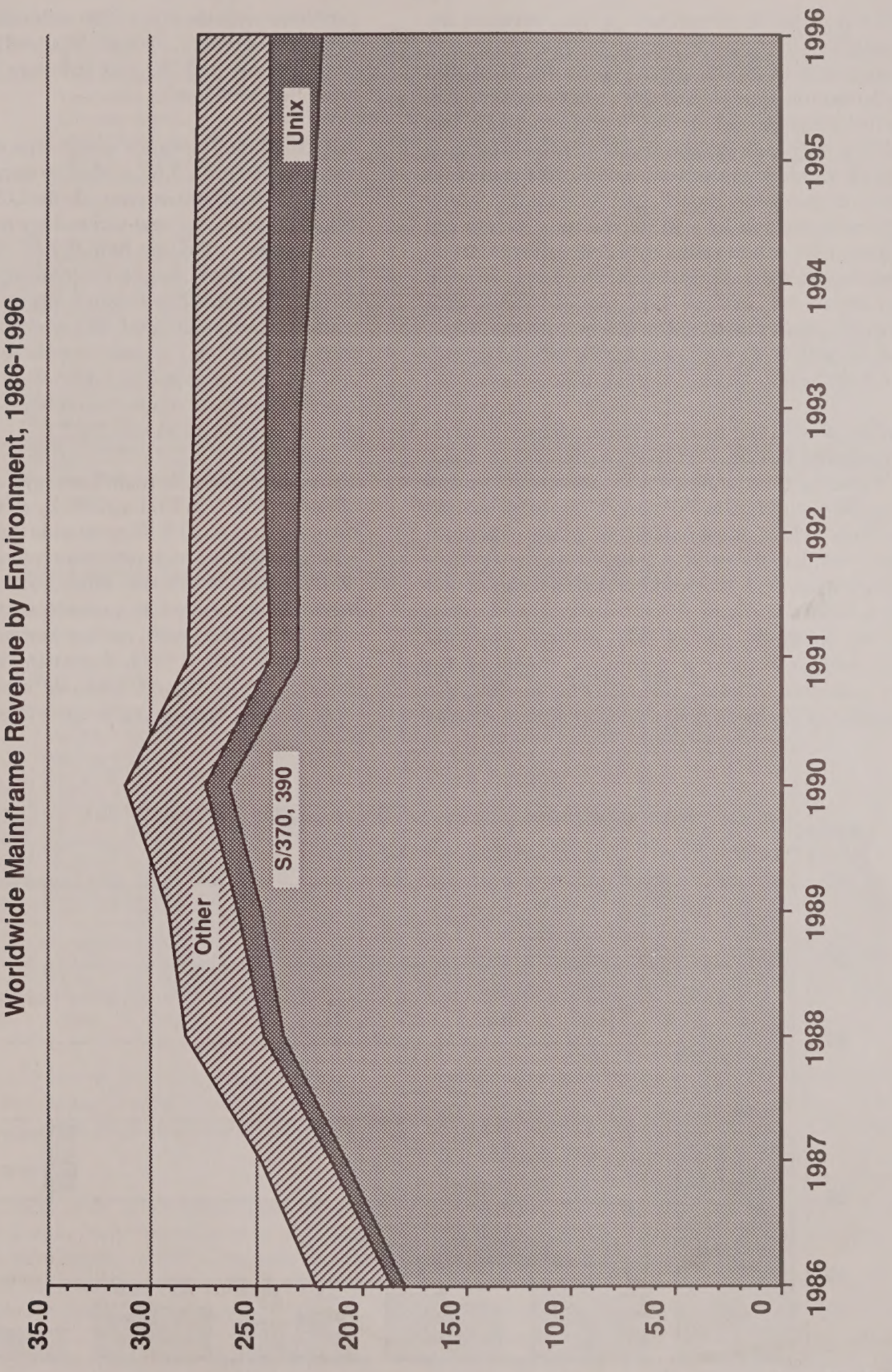

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Profiles of Leading Mainframe Suppliers

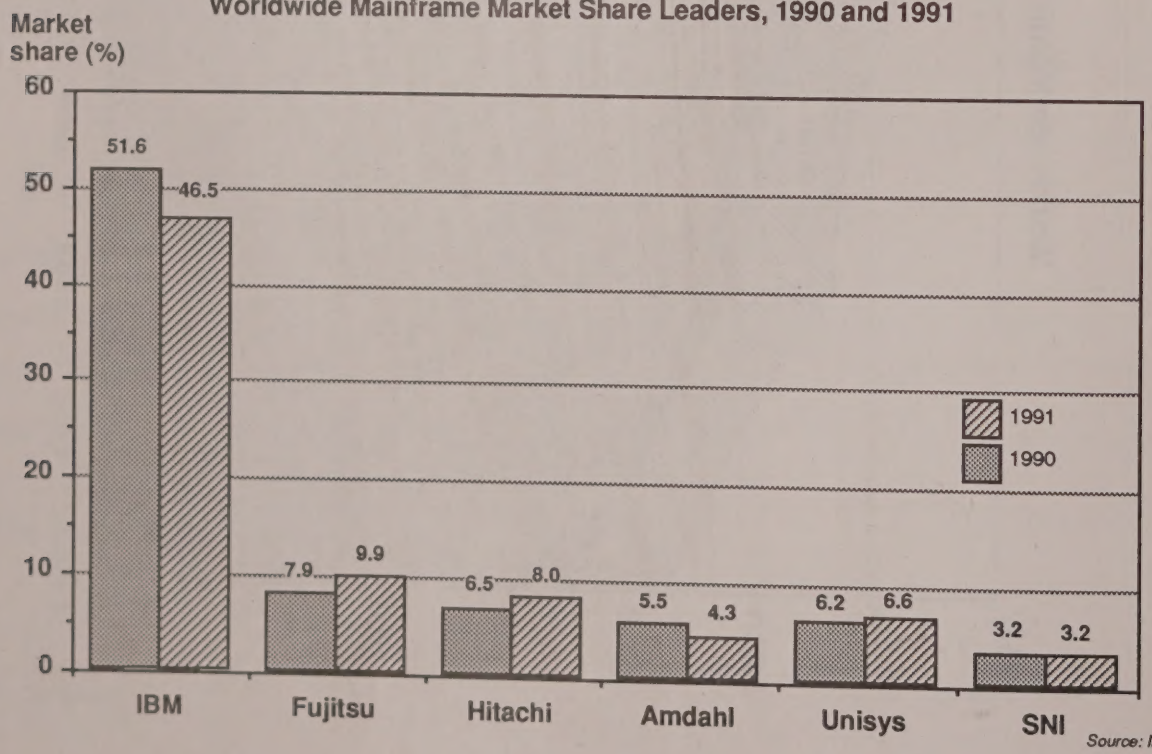
IBM's worldwide mainframe system revenue decreased by 18.6% in 1991 from 1990 levels. It may never return to 1990 levels again. In the U.S., IBM fared even worse, mainframe revenue was off 23.0%. The first three quarters of 1991 were particularly bad as IBM attempted to migrate customers from existing ES/3090 technology to improved ES/9000 platforms based on the same repackaged technology. Many customers decided to wait for the new technology systems, which didn't ship until September. Activity picked up considerably in the fourth quarter. In addition, after a tremendous 1990 for IBM DASD, the company felt increased competition from the PCMs, most notable HDS. As a result, IBM offered significant DASD discounts for the first time.

Amdahl's worldwide mainframe system revenue decreased by 28% in 1991. Sales in the United States decreased by 20%, while sales outside the U.S. plummeted 36%. Amdahl faced many of the same market dynamics as IBM, most notably very steep discounting as a result of the need to maintain a price/performance lead over IBM. Although Amdahl was able to ship a limited quantity of new technology M-class systems before the end of 1991, volumes were not great enough to make a significant impact on the year's revenue. Amdahl was also hurt by delays in shipment of the new 6390 DASD products, and by problems with the older 6380 technology. With these problems behind it, Amdahl is poised for a significant improvement in 1992, but still may have difficulty achieving 1990 levels.

Hitachi Data Systems's worldwide mainframe system revenue grew 7.6% fueled by strong U.S. growth (13%), whereas growth outside the U.S. was 4%. HDS began shipping its new-technology mainframes and 7390 DASD in the first half of 1991. This, combined with more conservative discounting policies, produced one of the few bright spots in the 1991 mainframe market. HDS uses its excellent reliability ratings on DASD and systems to new accounts for storage and mainframes. In addition, a strong performance message for its storage subsystems is expected to continue the trend into 1992.

Unisys's worldwide mainframe system revenue declined by 11.9% in 1991, driven by a 14% drop in U.S. business and an 11% drop outside the United States. Unisys made two major announcements in 1991: the A Series and the 2200 Series. While both announcements were sorely needed to provide current customers with an upgrade path, neither system shipped until the second half of 1991, decreasing impact on 1991 revenue. They should translate into an improved 1992. Unisys's major challenge is to attract new cus-

Worldwide Mainframe Market Share Leaders, 1990 and 1991



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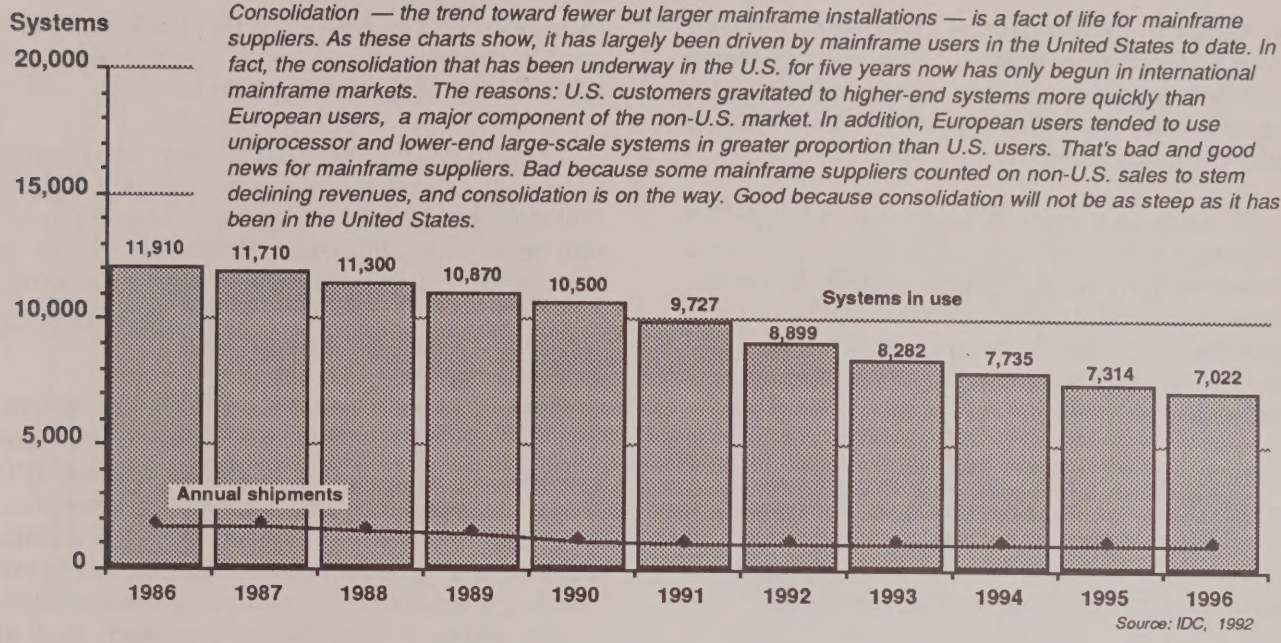
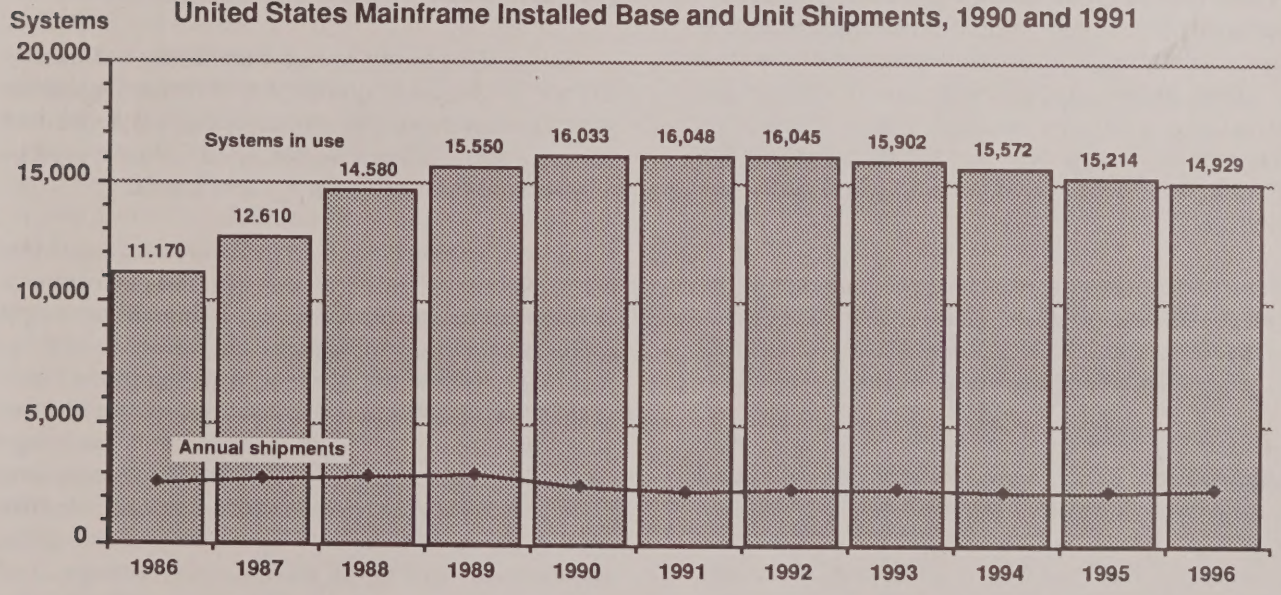
International Mainframe Installed Base and Unit Shipments, 1990 and 1991



Consolidation — the trend toward fewer but larger mainframe installations — is a fact of life for mainframe suppliers. As these charts show, it has largely been driven by mainframe users in the United States to date. In fact, the consolidation that has been underway in the U.S. for five years now has only begun in international mainframe markets. The reasons: U.S. customers gravitated to higher-end systems more quickly than European users, a major component of the non-U.S. market. In addition, European users tended to use uniprocessor and lower-end large-scale systems in greater proportion than U.S. users. That's bad and good news for mainframe suppliers. Bad because some mainframe suppliers counted on non-U.S. sales to stem declining revenues, and consolidation is on the way. Good because consolidation will not be as steep as it has been in the United States.

Source: IDC, 1992

United States Mainframe Installed Base and Unit Shipments, 1990 and 1991



tomers based on the strength of its application development environment and capabilities in specific niche markets such as telecommunications and transportation.

Japanese suppliers fared much better than others. Fujitsu's worldwide mainframe system revenue jumped 11% to $2.7 billion in 1991, primarily due to strong sales of the M-series. Hitachi's worldwide mainframe sales also jumped by 11% over 1990 levels.

Among other U.S.-based suppliers, Digital showed considerable growth, 19.0%, based on a full year of VAX 9000 shipments. However, the majority of these shipments went to existing VAX customers looking for a consolidation platform. Tandem's worldwide Cyclone business grew a modest 5.0%, with all of the growth coming from outside the United States. Tandem's domestic Cyclone business dropped by approximately 15.4% from 1990.

In Europe, Comparex was a bright spot, with worldwide revenue growing 7.0%. Siemens/Nixdorf dropped 10.8% and Groupe Bull declined 4%.

Ken Olsen, Digital and Disintegration

Ken Olsen's departure from the $14 billion company he started the same year Sputnik was launched marks more than just the end of one regime and the beginning of another. It marks the passing of an era for the entire computer industry.

He has been a great visionary. The PDP pulled computers out of the glass house forever. It pioneered interactive computing. Digital's scalable VAX architecture provided customers a new level of security against obsolescence. Its networked, distributed systems set the stage for today's most important new products.

He has been a great entrepreneur. Few of them stick around for three decades. Especially in the computer industry (the names Canion, Jobs, Perot, and Wozniak come to mind). Of those who do, not one has been as effective as Olsen has been at Digital.

He has been a great manager. Growing from backshop tinkerer to mega-company manager is an unhappy transition for most entrepreneurs. It is true that Olsen always appeared to derive greater joy from talking about new products than managing his F50 company. But he deserves great respect for the zeal and success with which he attacked each new challenge.

If he's so great, why must he go? For all the vision, for all the technical wizardry, Ken Olsen appears to have underestimated the gravity of the mitosis and metamorphosis of the computer industry.

Today Digital's greatest challenge is a complete modernization. The company must be rebuilt around the new market reality. Microprocessors (Alpha), general-purpose systems (VAX), desktops (VAXstations and Intel PCs), and its host of services are different enough to warrant a wholly new corporate philosophy and structure. In many ways Olsen's abrupt departure affirms the rapidity with which disintegration has overtaken the industry.

What's next? Successor Bob Palmer, who apparently offered Olsen an acceptable mix of engineer, entrepreneur, and bottom-line manager, needs to refocus the independent businesses and development teams that compete for resources. His task is closer to that of a juggler than a butcher: toss everything up in the air, extract like components and then focus, focus, focus. One word that has been heavily used to describe him — tough — will hold him in good stead over the coming months.

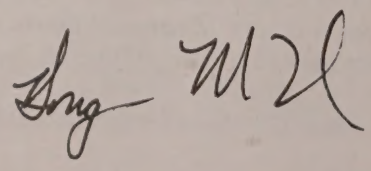
His actions will be neither easy nor popular. Change is hard. Layoffs are excruciating. Despite first-class people and technology, Digital's future will be anything but easy. Fortunately, this is the bottom. Digital will experience another six to nine months of ugly financial news and painful change before anything gets better.

But behind every cloud is a silver lining. We offer another word for Digital's coming months and years: opportunity. Digital is a goldmine waiting to be tapped. It has been held back by an amorphous corporate organization that has stifled innovation and inhibited product delivery. Unshackled by corporate bureaucracy, individual businesses within Digital will have every chance to prosper. Then the company would be poised for comeback.

Some of its many varied businesses will thrive, driven by the same qualities that drove Digital for years, uncompromising engineering and dedication to customers. Others may not. Their failure would be a lesser evil than subsidising their losses.

As for the new boss, he will likely be measured by a completely unrealistic yardstick: the performance of his predecessor. Better metrics of his success might include important things that Digital never did before. Bob Palmer might do well to minimize hardware development and focus on delivering innovative software and services. Maybe he can leverage Digital's relationship with Microsoft and bundle new products with Windows: a names service, distributed computing tools, and CASE tools. Perhaps he should beef up Digital's OEM chip, storage, and systems businesses, and let them sink or swim once and for all.

Transforming Digital calls for nothing less. After all, Microsoft's margins are a lot more attractive than Gateway's. Questions that challenge Digital's conventional wisdom are the questions of the day.



THE GRAY SHEET
Computer Industry REPORT

DOUG McLEOD, EDITOR JULY 31, 1992 • VOL. 27, NO. 19 Published continuously since 1964.

Ubiquitous Computing: Opportunity in Unknown Markets?

The current interest in pen computers, palmtops, personal digital assistants (PDAs) and smaller notebooks is driven by a little pragmatism and a lot of fantasy. Apple's John Sculley calls PDAs part of a "billion dollar megamarket." Intel's Andy Grove calls the palmtop frenzy a "pipe dream."

Demand for notebooks and pocket organizers *is* very strong. To offset flat demand for generic PCs, suppliers need to hone their understanding of users' mobile/ubiquitous/pocket (choose one) computing needs. Only then can they build products with new features users want. The vast majority of the challenge is, as always, software development.

That means more than just new interfaces and applications. It means quantum leaps in networking ability, automation of new types of tasks, integration into other communications systems, and development of the myriad possibilities of electronic publishing (in its broadest sense), among other new and unknown functions. If the pen paradigm is no more than an alternative to keyboard-based data entry, it will not live up to overhyped expectations.

Demand for mobile computing software implies a significant change of focus for mainstream PC makers. They are only beginning to address it. As R&D resources remain focused on miniaturization right now, the mobile hardware market receives the brunt of much speculation and attention. In fact, two distinct markets, smaller notebook PCs and scientific calculators, are converging while handheld computing is slowly developing. The result is confusion. Consider the following:

- Desktop PC functionality is filtering down. A new generation of smaller notebooks (Olivetti's Quaderno and Samsung's Handbook, for example) are based on one assumption: PC users want desktop functionality on smaller, lighter systems. The result (in a year or two): half-pound active-matrix color VGA diskless 486 systems with 64MB RAM running Windows and thousands of applications. Or, tablets running Penpoint and pen applications. Nifty, but are they for everyone? Do they deliver on "the promise" of the PC or the pen?

- Scientific calculators are growing up. Devices with very specific functionality (pocket-size spreadsheet calculators like the HP-95LX, personal organizers like the Sharp Wizard and the Casio BOSS) offer users solutions to specific problems. They run DOS, too. Sharp and Casio are targeting "business consumers," while HP is aiming at a more technically oriented user. The dilemma for makers of these products: offer new functions without diluting core strengths and weakening appeal to a loyal user base.

- PDAs are coming out of nowhere. Apple's incipient introduction of what it calls a new generation of portable personal computers is long on the vision thing but short on practical application so far. A handheld communicator that replaces notepads, address books, daytimers, cellular phones, cassette tapes, newspapers, and paperback books is a compelling notion. But how realistic is it? The artificial intelligence that makes Newton more of an assistant than a notetaker, the core technology driving the new functionality, is still very early in its life cycle. Truly profound innovations typically require another five years before they're market ready. Can Apple deliver the incremental function this spring? How will the new technology be assimilated into a base of Macs and PCs?

The new markets for mobile computers are dominated by more questions than answers. Will the

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three markets converge? How much will consumers pay for a handheld "assistant"? What new functions will it provide? Which companies will make it? And, what will drive the market: horizontal or vertical applications? Price or function?

No doubt, much of the recent activity has been stirred up by plummeting PC hardware prices. Users and suppliers are responding to the idea that portable PCs may be on the verge of delivering new functionality at prices significantly below $1,000, as low as $100 or $200. Suppliers talk of price targets end users will accept: the monthly car payment, $200 — the level at which many married individuals will need to get the spouse's OK.

The possibility that mobile PCs can enable a completely new functionality is equally compelling. Artificial intelligence (Apple Newton) and a voice interface (Olivetti Quaderno) are just two technologies that promise new functionality. There are many more. Who wouldn't want the power of their desktop or back-office computer system — only easier to use and more appropriate for on-the-go professionals — in a coat pocket?

In many ways the promise of the PC revolution remains unfulfilled. Desktop PCs remain the domain of white-collar office workers. DOS, Windows and even the Macintosh desktop interface remain arcane and confusing to a vast majority of potential users who "don't do computers."

Mobile, ubiquitous pen computing is the next step in the long, slow journey into the information age. It's not the final step. It's really just the beginning of the beginning, but a lot of computer companies are recognizing the importance of reconciling the pen metaphor into their short- and long-term plans.

Gauging the Revolution — When, How, How Big? And So What?

In the near term (two to five years), IDC expects demand for all segments of the worldwide portable computer market to remain very strong. Stronger, in fact, than any other hardware segment.

By 1993 worldwide pen hardware revenue will top $1 billion. By 1996 it will surpass $6 billion. Ten years from then it may be much larger. PC companies will rapidly mobilize to deliver pen-based solutions.

Mobile, ubiquitous, computing software is another story. The most compelling opportunities in the PC industry lie in mobile computing software.

To estimate just how compelling, consider the following oversimplified-but-still-useful analysis. How many desktop PC software companies have been formed since 1980? Maybe 700. How big is the desktop PC universe of potential customers? Maybe 600 or 700 million white collar workers worldwide?

Now, how many mobile computer software companies have been formed in the past three years? Perhaps 50? Add to that another 200 or 300 established ISVs writing mobile applications. When you figure the entire market for mobile computers — every member of every developed nation, and half of the less-developed countries, the supplier/target ratio compares very favorably to the desktop ratio.

The markets will be very large. The opportunities will be grand. But to get a good measure of the implications of new mobile PCs, ask three questions:

- Are the products meant to automate people's *business* lives?
- Are they meant to automate people's lives?
- Or, are the products meant to manage the conversion to the digital media universe?

Products over the next five years will address only the first question. Five years after that, or after that, the host of intriguing issues posed by the other questions will come to the fore. Today's exciting new products are beginning on a long road. But it will be a long, slow journey.

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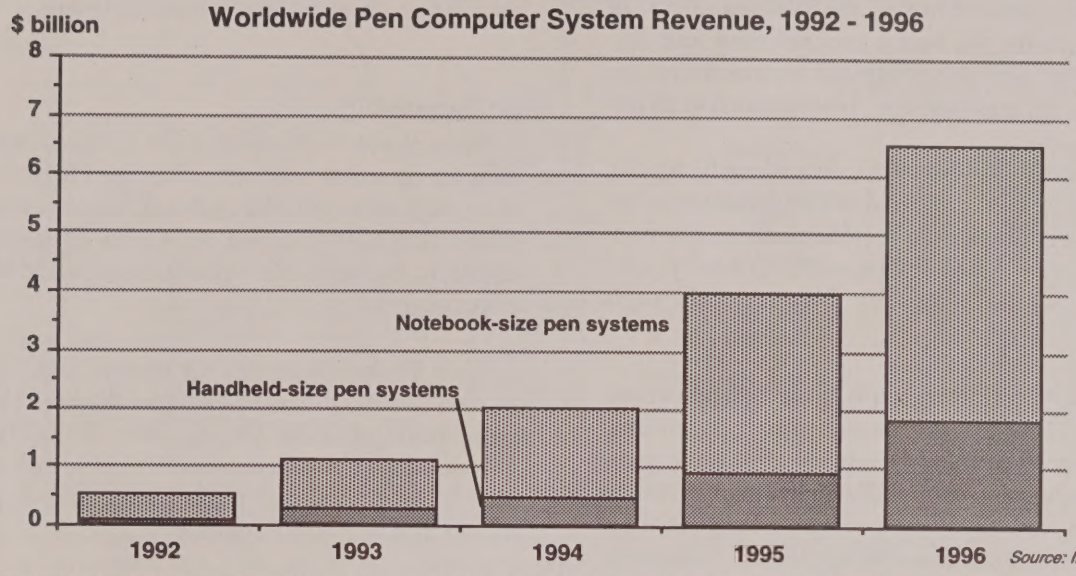


Notebook size includes units 7.5 lbs. or less, roughly 8.5 by 11 inches: Grid's GridPad, and the NCR 3125, for example. Also included are pen-equipped notebooks, such as those from Momnenta and NEC's Ultralite SL/P. Smaller form factors include ruggedized hand-held devices such as the Apple Newton, Grid's PalmPad and Poqet's PoqetPad, as well as palmtops and consumer devices such as Sony's PalmTop in Japan.

The Pico, Pen and Palmtop Players: Apple, Go, Slate and More

Mobile computing promises to revolutionize the computer industry. At stake: the gradual dissolution of the old Microsoft DOS/Intel X86 duopoly and its replacement with a new standard.

Many of today's largest software companies are planning to compete in the pen market. They are of two varieties: systems software providers (Go and Microsoft, for example), and companies writing and rewriting applications for the new form factor (PenSoft, Slate, and other new ISVs).

Another group of companies are experimenting with new hardware designs: traditional PC companies making pen and subnotebook hardware or software (e.g., Apple, Dell, IBM, and Olivetti), pocket organizer manufacturers (Sharp), pen hardware suppliers (MicroSlate and Trigem). Following are profiles of the major pen computer players.

Systems Software: Apple Computer

No company has had such a visible impact on the handheld computer market as **Apple**, especially since it will not be selling a handheld product until 1993. John Sculley's January speech that outlined Apple's plans for Newton at the Consumer and Electronics Show in Las Vegas was a defining moment for the infant industry.

The Newton that most people remember is a handheld computer running a proprietary operating system on an Acorn RISC Machines RISC microprocessor. It will include wireless communication with nearby communication hubs located in specially equipped office machines, including desktop Macs, laser printers and fax machines.

However, the most important aspect of Newton technology is software. Apple realized, perhaps three years too late, that its future was tied to making money selling software. Even now the company is hedging its bets by partnering with Sony (Powerbook), Sharp (Newton) and others.

Intelligent AI-based programming at the heart of the operating system make Newton more than just an electronic notetaker. The ability to recognize names, dates, places and tasks, and the ability to act logically upon them, is what, according to Apple, makes Newton an assistant, not an organizer.

On its own AI is not enough to offer great new functionality. Consumers would not buy a Newton just to watch it guess or predict what they want it to do. They want Newton to do it. Communication is key.

(continued next page)

To that end, Apple has another advantage: Appletalk. By incorporating the best elements of Appletalk into its products, and refining and improving them, Apple has instant connectivity, instant legitimacy, and perhaps, instant market share.

The handheld Newton will, according to Apple, fax, print and upload or download information automatically. It will assimilate itself into office networks transparently. It may even automatically and proactively scan for nearby Newtons through Appletalk.

The use of AI makes Newton more than just a new form factor. It is indeed a new computing paradigm. Future hardware implementations of the Newton software underlying the handheld product promise to refine that paradigm further. Apple is closer than other hardware or software companies to delivering "ubiquitous computing."

GeoWorks

GeoWorks publishes the PC/GEOS graphical operating system and GeoWorks Pro productivity applications. The company recently introduced Pen/GEOS, a pen version of the systems software targeted at the sub-$500 market.

GeoWorks has several hardware customers lined up. The Tandy/Casio coalition will employ the GEOS/pen operating system when it ships in 1993. GEOS/pen currently runs on the Poqet Pad. The company claims sales of 400,000 units of GEOS.

PC/GEOS is a technically brilliant yet undermarketed product. If GeoWorks can overcome the perils that have shaken other engineering-driven companies, it may become a strong alternative to Microsoft and will continue to challenge Go for the lead in pen computing systems software.

Go Corporation

System software startup Go Corporation is bidding to do what neither IBM nor Unix could do: loosen Microsoft's hold on the PC software industry. It may very well succeed, or at least squeeze out the same type of profitable niche that propelled Microsoft to its heights.

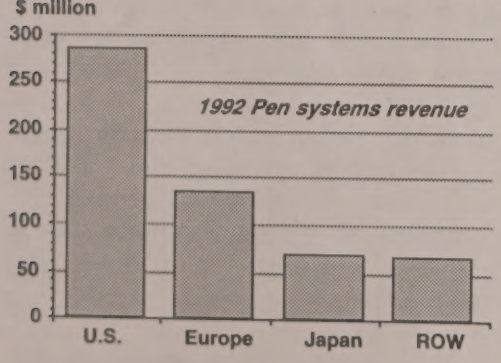
Go's Penpoint operating system, introduced in January 1991, is the technology leader in the burgeoning pen computer market. Penpoint currently runs on 386-based systems from a handful of suppliers. More than 40 hardware companies have announced pen tablets that will run Penpoint.

Penpoint was initially developed for Intel 386 processors. AT&T and Go recently announced it will be available on AT&T's Hobbit RISC microprocessor when it is available sometime next year.

Penpoint offers significant advantages over PenWindows. It has been built from the ground up to deliver ease of use from pen tablets. It is object oriented, to simplify ports, multiprogram collaboration and functional enhancements. It provides true multitasking and multithreading.

Go is amassing market momentum. Hundreds of ISVs are writing to Penpoint. The 40 OEM hardware companies building hardware to run Penpoint have announced a wide variety of products. Each is of a similar form factor: a notebook-sized flat panel. So far, only a handful of them are on the market. But, very importantly, IBM's ThinkPad will use Go.

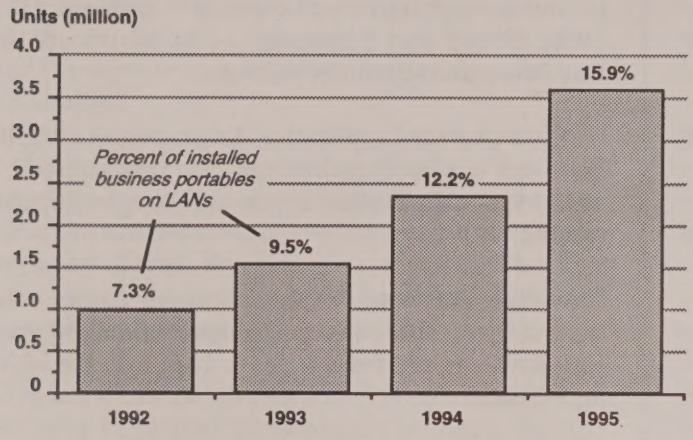
Worldwide Pen Computers: Barriers, Inhibitors and Revenue

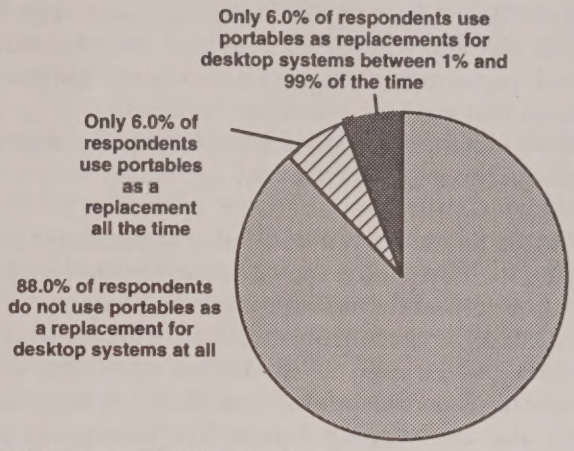


	United States	Europe	Japan	Rest of World
Primary accelerators	Multiple target markets; sophisticated end users	Size and sophistication of market	Written language & gadget orientation	Size and inexperience of potential markets
Primary inhibitor	Expense and utility	Localization and expense	Handwriting recognition and expense	Localization

Source: IDC, 1992

How Mobile PCs Fit into Users' Habits: LANs and Replacement PCs





The chart at left shows the growth in the installed base of mobile PC LAN adapters, and the percent of business portables that have LAN adapters. By 1995 only 15.9% of mobile business PCs are LAN-able. The chart at right shows that the overwhelming majority (from a sample of 201 mobile PC users) of mobile PCs are used as complements to desktop PCs, and rarely as replacements.

Source: IDC, 1992

Go has broader plans than the current pen notebook. The company envisions its software running on a range of products from Penpoint post-it notes to application-specific hardware implementations. One barrier looms: Microsoft. It has been moderately successful in blocking Go's momentum because ISVs are wary of alienating Microsoft.

Microsoft

Microsoft's PenWindows is an extension of the DOS/Windows desktop operating system. That's good and bad. Good because porting applications to PenWindows will require less work than writing applications anew. Bad because upgrading Windows to assimilate the new pen technology necessitates dragging excess baggage from desktop DOS into the pen equation.

The significance of the largest installed base of users in the world is difficult to overestimate. Windows users will probably be more likely to purchase Windows-enabled pen hardware than some other kind of pen system. They will have seen the interface. They will have their familiar applications. They will feel less risk.

On the other hand, function is everything in new markets. PenWindows may be long on comfort and security but short on incremental functionality. If all that PenWindows provides is a functional alternative and equivalent to small notebooks running Windows with a sidecar mouse, why bother with the pen?

Will switching to the pen provide enough extra function and efficiency to Windows users to warrant the additional expense and learning? Microsoft is betting that pen-enabled familiar applications will offer customers a good tradeoff. Incremental functionality, albeit moderate, for a small investment.

Application Software Companies

Atelier Systems develops telecommunication front ends for notebook and desktop PCs. Its first product, Atelier Hello combines a contact database and a word processor.

Communication Intelligence makes multilingual handwriting recognition software with interfaces for Pen Windows and Penpoint, as well as proprietary environments.

Ink Development announced two products for Go's Penpoint operating system in April 1992: Inkware Notetaker and Photo. Notetaker is a data-entry package. Photo is an image-processing package.

Nomadic Systems develops software that attempts to simplify problems associated with working with more than one PC or with a PC in more than one place.

Palm Computing is developing applications for palmtop markets. The company has announced licensing agreements with Casio, GeoWorks and Tandy, and also sells a handwriting recognition technology.

(continued next page)

PenMagic Software has developed an application called Numero, a financial word processor that runs under Go's Penpoint. The company was founded in 1990; Numero was released in April 1992. Numero's work-pages metaphor provides a broad range of templates that can be customized for specific tasks: columnar financial paper, datebooks, expense reports, and checkbooks, for example.

Pensoft develops pen computer applications software. Its only product to date, the Perspective personal information manager, runs on Penpoint. Perspective is built on an object database and utilizes an organizational tool called the Associate that automatically links like information. Slate has signified it will also be shipping Perspective through as-yet-unannounced OEM channels.

Although not quite as ambitious as the AI Apple is building into Newton's base functionality, the Associate marks an attempt to provide the kinds of incremental functionality users might demand before committing their calendars to pen computers. Perspective will be sold through retail channels.

Slate Corporation, formed in 1990, is the largest and best-known software provider for pen computers. The company sells a range of pen tools and utilities for both PenWindows and Penpoint.

Among its horizontal applications are products such as a personal organizer based on the DayTimers brand name, At-Hand spreadsheet, and PenBook electronic book software as well as password and file transfer utilities. Slate has agreements with six OEM hardware suppliers — Microslate, Momenta, NEC, NCR, Poqet and Samsung — to distribute the DayTimer pen scheduler software.

Slate's vertical application development tools, the PenApps applications builder, was first shipped in 1991. Most of the vertical applications began shipping in 1992.

Traveling Software develops portable communications software that connects computers in many environments. Its products include LapLink, DeskLink and WinConnect.

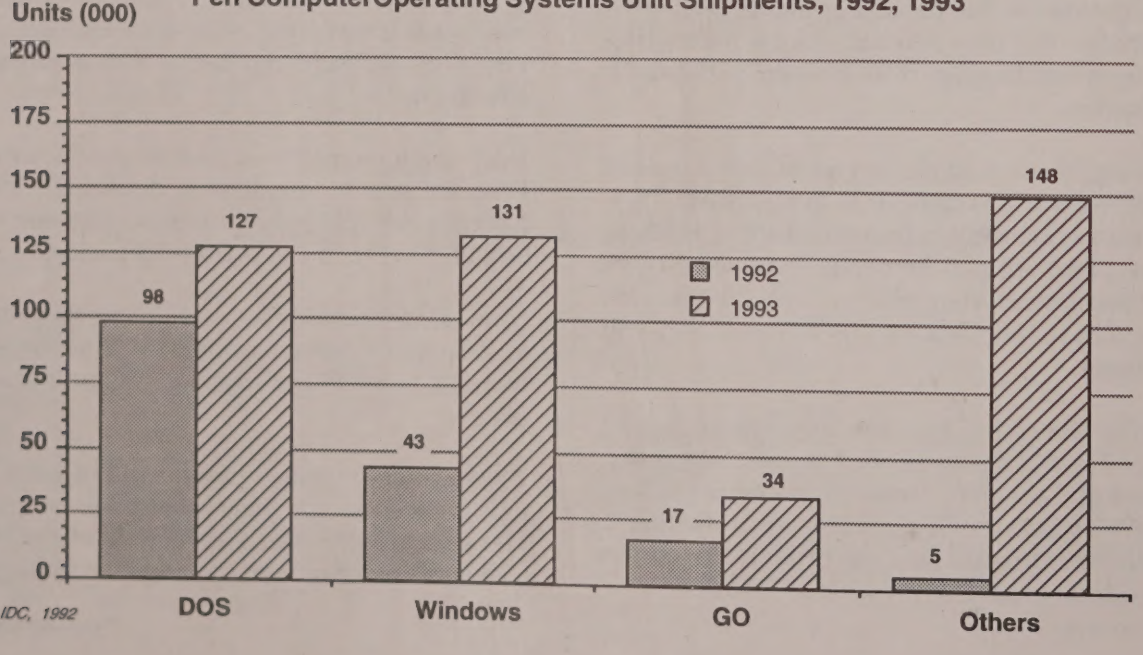
Smaller Notebook, Pen Computer, and Pocket Organizer Manufacturers

Strong sales of notebook PCs — one of the very few bright spots in the worldwide hardware business — is just the beginning of the mobile revolution. Notebook suppliers are already releasing smaller, faster notebooks, pen computers and other new form factors.

The new products are highly portable, and suppliers across the board promise great innovation and new functions. But potential problems abound.

Strong growth in smaller notebooks does not necessarily mean pen computers or subnotebooks will also sell well. The usability of tiny screens and key-

Pen ComputerOperating Systems Unit Shipments, 1992, 1993



boards remains a question. Battery life is limited to several hours in most cases — far too short for consumer applications. Users may require compatibility with Windows on their desktop, but may not want to buy PenWindows in light of Penpoint's perceived advantages.

The majority of suppliers are targeting their systems for vertical applications. Broader horizontal applications to drive consumer electronics-like volumes are expected later. Following is a sampling of smaller notebook, pen computer and handheld organizer competitive standards.

AT&T/NCR is the leading mainline systems and PC company in the pen hardware marketplace. Its 3125 Notepad tablets are available immediately. AT&T/NCR and Go recently announced that Penpoint will be ported to AT&T's Hobbit RISC chips. The two have outlined long-range plans for a broad range of "personal communicator" products that mesh the intelligence of mobile computing with the ease of use and functionality of the telephone.

Dell Computer recently began shipping a 4lb. 386-based subnotebook. It provides traditional PC functionality in the smallest, lightest form factor of any major U.S.-based mainstream PC supplier. List price: $2,199.

Olivetti's recently announced 2.2lb. Quaderno subnotebook is about half the size of most notebooks. It runs a range of proprietary built-in applications and DOS, and doubles as a voice recorder and answering machine. The Quaderno is already on sale in Europe and will be available elsewhere, including the United States, when Olivetti has found suitable distribution partners.

Poqet Computer is a leader in developing vertical-market mobile hardware. The company, which became a wholly owned subsidiary of Fujitsu last month, builds and sells the PoqetPad, a one-pound pen computer for vertical applications. PoqetPad is sold through "Poqet Partners" — systems integrators, VARs and OEMs.

Samsung's Handbook PC also measures about half the size of a notebook. With a 60MB hard disk and faster processor than the Quaderno, the Handbook will be priced around $5,000 when it is available later in the summer.

Sharp Electronics has at least one thing going for it: volume. At between $200 and $600 its palmtop personal organizers have captured significant market share and momentum. The next generations of personal organizer products will collide with the new subnotebooks and pen computers. Notebook functionality at personal organizer price points (that PC companies may have trouble reaching) may drive Sharp's volume even higher.

Sharp unveiled a pen upgrade to the Wizard line last month. The OZ-9600 Wizard is shipped with 256K of memory and includes a range of personal productivity applications, including many third-party applications available on memory card. Like previous versions of the Wizard line, the OZ-9600 is based on Sharp's own microprocessor. In addition, Sharp builds and sells a full range of Intel-based notebook computers. Sharp was the first licensee of Apple's Newton software technology in March.

Tandy Corporation has announced an agreement under which **Casio** will design, develop, manufacture, distribute and market a family of "personal information processors." The operating system will be furnished by Geoworks, and Palm Computing will contribute applications. Tandy's Grid subsidiary is a leading provider of Intel-based vertical-market pen tablets and notebooks. Grid products are sold through dedicated retail storefronts and large-volume agreements with systems integrators and VARs.

Trigem Corporation introduced the first 386-based pen computer in October 1991. The product was designed and developed by the Eden Group, a U.K.-based company, which then licensed the manufacturing and distribution to Trigem. Trigem is the U.S. subsidiary of Korea-based Trigem Computer.

Pen Computers: the Next Wave

Ubiquitous mobile computing promises to revolutionize the computer industry. At stake: the Microsoft DOS/Intel X86 duopoly, and much more. The transition provides a case study of the cyclical technological substitutions that regularly uproot the computer industry.

Consider this scenario: A few farsighted companies recognize the potential of a new technology, mate it with the best of existing complementary technologies and create an interesting and innovative new product.

The new product solves specific problems in vertical applications. In time, it is generalized to a larger audience. They offer enough new functionality to persuade customers to buy them. Despite barriers — a certain level of incompatibility with the installed base and an unknown cost/benefit — the new products succeed.

Such cycles epitomize the computer industry. Minicomputers, personal computers, fault-tolerant computers and many more products revolutionized the industry in the same way. They upset the status quo when it seemed unshakable.

Pen computer systems represent the largest threat to date to the near-monopolistic dominance of two great American companies. Most of the new systems are centered around low-power RISC chips, and they run operating systems designed to maximize pen power.

The Intel/Microsoft duopoly and a growing network of pen-based companies will coexist during the acute growth of the new market over the next five years. PenWindows will run the applications sponsored and authored by large, conservative users. Organizations with existing investments in Windows will gradually move to the new hardware platform, but will not abandon their investments in Windows.

Suppliers of alternative technology have a harder mission. Their problem is product definition. Their new products must offer compelling reasons not to go to Windows pen systems and notebooks.

The need to combine breakthrough hardware (size, weight, pen, storage, networking) with breakthrough software (simple systems software, exciting and relevant applications, ease of use) creates a unique situation: the need for integrated suppliers. The most successful suppliers will tightly couple hardware and software in their products. Indeed, some pen software suppliers will bundle vertical-market applications with their products. Such prognostication seems to fly in the face of IDC's disintegration theory.

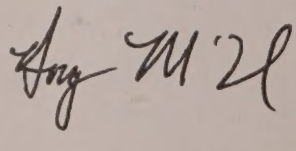
It won't last long. Once the applications for such devices are well defined, once the standard software interfaces are clarified and once useful form factors have been established, the process of disintegration will again roll. Until then, the competition is more focused on building agreements and rationalizing vision than building products. Small companies are attempting to overcome the barriers their integrated foes have already addressed.

The pen/mobile/ubiquitous computing paradigm is the next step in the evolution of the glass-house computer to a consumer product. It's an important step, equally as important as the VAX, the Intel/Microsoft duopoly and the Mac. Each step put muscle behind the "computers for the rest of us" approach to marketing with which companies have been addressing IBM for three decades.

But with each successive step the practicality of the original utopian vision becomes more questionable. Surely the pen metaphor and the possibilities of boundless ubiquitous networks will make some people more productive. But does every member of society need a computer? Does everyone want one? Where do we draw the line between our businesses and our lives?

In 20 years we might look back at 1993 as the year that computers finally became a consumer product. It may well be the year the information age began to embed itself so deeply into our lives that it became our lives. Mobile computing — in at least some of its many current shapes — is here to stay.

Companies will ready themselves for the metamorphoses wrought by very inexpensive pen hardware, unbounded networks and new software paradigms in two ways. Some will jump to the new technology blind, some will cling to their old platforms. Either strategy on its own is shortsighted. A cautious *and* optimistic approach, concurrently, will serve them best. The appeal and use of new technology will not wait.



THE GRAY SHEET
Computer Industry REPORT

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User Cultures: The Worldwide IT Market

Just how unique are individual country markets? What accounts for differences in levels of customers' IT spending?

Put another way, do globally pervasive technologies — such as MS/DOS, S/370, Netware, and Unix — tend to overshadow cultural idiosyncracies? Or, conversely, does each national environment define its own unique marketplace in which it is the technology, not the customer, that must adapt?

The answers to these questions are either the explicit, or more likely the implicit foundations of IT suppliers' worldwide organizational and marketing strategies. They remain the focal points of IDC's worldwide research.

IDC has conducted an extensive study which compares IT customer directions and spending patterns in the five largest worldwide IT marketplaces — the U.S., Japan, Germany, France, and the U.K. In total, we conducted some 7,000 interviews with IS executives. The matrix of influences includes a smattering of external and internal forces. Although it is always difficult to generalize, strong affinities between the U.S. and U.K. marketplaces are clear. Sometimes Germany and France fit the English-speaking pattern, but equally often they do not. On the other hand, Japan differs from the worldwide trends in the great majority of cases.

External factors have the strongest effect on spending. The best overall indicator of a customer's IT budget is the overall health of the company. A country's economic health also has a major effect on IT spending. National culture budget items most associated with people: staff availability, and software development, for example.

Within any country, factors specific to individual customers also play a large role in determining IT spending. The customer's host environment is a strong predictor of customer behavior. The willingness of specific customers to take risks on new technologies also affects spending. Some of our specific findings:

- Key IS Challenges. When asked about their most important challenge for 1992, IS management ranked migration to more modern platforms, integration of central and end-user resources, and controlling costs as roughly equal priorities.

- Cost Control. German and Japanese customers are much less concerned with cost control than their U.S., U.K., and French counterparts. However, while German users have a strongly positive overall attitude towards IS spending, Japanese customers are more negative than users in Germany, the U.S., the U.K., or France.

- Organization. In terms of their approach to the management of IT activities such as PCs, LANs, and telecommunications, British and German customers take the most centralized approach, followed by the United States. Japan and France are the least centralized of the five countries studied.

- Human Resources. Finding and retaining high-quality staff is a big problem in Japan, a moderate one in Germany and France, and almost a nonissue in the United States and United Kingdom.

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- New Technology Adoption. Customers in Germany and France plan to adopt new technologies more quickly than either the U.S. or U.K., and much more quickly than Japan.

- Unix. European customers plan to move toward Unix significantly faster than customers in the United States. Japanese interest in Unix remains quite low.

- MS-Windows. France leads the way in Windows penetration of their MS-DOS PC base, while movement towards Windows in Japan is still tentative.

- LANs. Japan is the only laggard here — acceptance rates in the U.S., U.K., Germany, and France are broadly comparable.

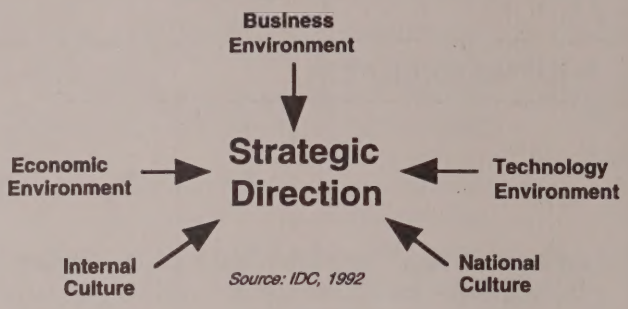
The results contribute to two kinds of understanding. First, they give companies metrics for measuring how individual country markets stack up against each other.

Understanding how the matrix of factors contributes to customers' IT expenditures forms the basis for IT suppliers' tactical planning. It allows them to target specific opportunities in country markets: professional services in Japan, for example, or PCs in the United Kingdom.

Second, the results establish a baseline for analyzing how IT is evolving in the worldwide economy. Over time, the baseline will give strategic planners a better idea of how to position their long-term IT strategies. Understanding how the weight of different factors in the matrix is changing reveals how the industry itself will change.

Of most importance to IT suppliers: How are customers adjusting their mix of IT vis a vis national and worldwide trends? How are IT users choosing to maximize their use of IT?

Figure 1
Key Factors Shaping Customer Behavior



In addition, the research examines issues of longer-term importance for IT suppliers. Is IT's role in the worldwide economy growing or shrinking? And, is it leading worldwide economic growth, or following it? Are IT markets converging or are they developing further national idiosyncrasies? Will countries' IT spending coalesce around certain norms and ratios? Has it already begun?

Over time, IDC's ongoing worldwide research will address each of these issues. While the short term outlook may look somewhat grim, an understanding of where and how users are changing their IT investments will lead to a better long-term understanding of the opportunities for IT suppliers.

Factors Shaping Customer Behavior

Figure 1 portrays some of the major determinants of customer behavior. Each factor affects different types of decisions.

Economic Environment. The survey results show a strong correlation between the health of the national economy and the overall budgetary environment. Customers in Germany and Japan not only expect solid IT spending growth, but in most cases are still not feeling strong pressure to contain costs.

Business Environment. By far the strongest determinant of a customer's IT spending environment is the overall health of each individual firm. There are also measurable correlations within specific indus-

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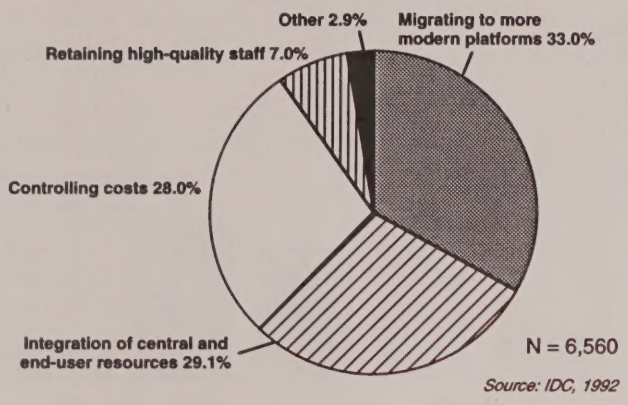
Figure 2
Key IS Challenges for 1992 in the U.S., Japan, Germany, France, and the U.K.*



*Respondents were asked, "Which one will be your site's most important area of focus over the next 12 months: (a) integrating central and end-user resources into a single enterprise information system; (b) controlling costs and improving the financial justification for continued IS investment; (c) recruiting and retaining top-quality IS staff; (d) migration from older systems to more modern hardware and/or software platforms; (e) other."

The data above represents the weighted average of the total spending power of the survey respondents projected to each country market. In other words, 33% of the total spending power in the five countries studied rated migration to more modern platforms as their top priority; 29% of the spending power gave top priority to integration of central and end-user resources, 28% to controlling costs, etc. The weighting formulas are complex; please contact IDC for any further information required.

tries — witness the strong growth of health care in the U.S., or the worldwide stagnation of the financial services industry. But the vertical industries show their most pronounced effects in the application workload area: the mix of database, OLTP, number-crunching, networking, application software and other requirements. It is in these areas that strong affinities exist across industries and across countries.

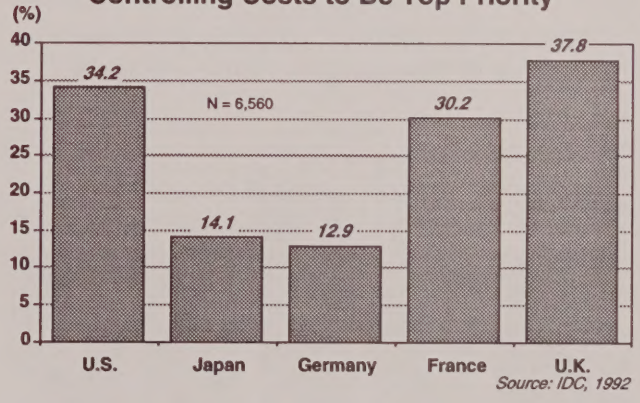
Technology environment. For this research project, IDC defined the technology environment by the senior host system at the site, or, in IBM terminology the "highest logical unit." The host environment is still a very strong predictor of customer behavior, particularly for future technology consumption — LAN vendor selection, interest in OS/2 or Unix, network management technology, etc.

For example, the best predictor by far of customers' interest in OS/2 or token ring technology is whether they have IBM mainframes or not. Similarly, the highest interest in the Macintosh platform is consistently found among Digital VAX sites. IDC recognizes that as distributed environments proliferate, the influence of the senior multiuser system will diminish in many accounts. However, this pattern will take at least several more years to measurably take hold.

National Culture. Not surprisingly, the issues most sensitive to country variation tend to be ones associated with people: availability of staff, software development practices, local language issues, IS/end user management philosophies, and the use of outsourcing, systems integrators, etc. A good example would be the relatively high emphasis on custom software in the Japanese market.

Internal Culture. Within any country, there is a mix of risk-inclined and risk-averse IS departments, as well as those which see IS in strategic terms and those which do not. As an example of the latter, 37% of the Japanese market said that they "rarely make more than marginal improvements" to their IS operations; in Germany and France the figure was just 3%.

Figure 3
Share of Country Markets that Consider Controlling Costs to Be Top Priority



IDC has designed its survey project to provide the industry's most comprehensive picture of the customer decision-making environment. What follows are some of the highlights of the research in the areas of key IS challenges, new technology adoption, Unix and open systems, and PC technologies.

The study also examined customer attitudes toward client/server computing, downsizing, outsourcing, end-user computing and software development strategies. All of the data in this summary is presented at the country market level. Additional de-

(continued next page)

tailed segmentations by senior host environment and vertical market are contained in separate volumes.

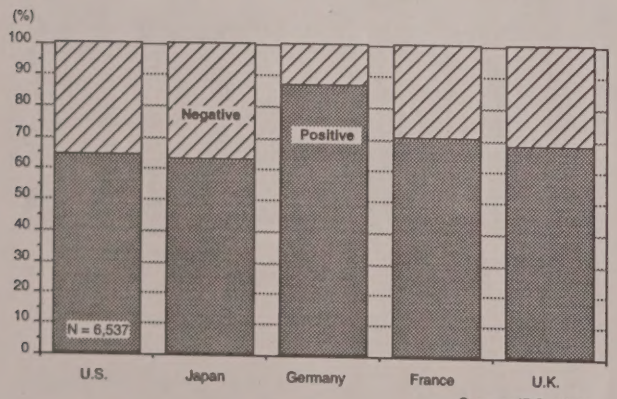
Challenges and Decision Making

Migration to more modern platforms, integration of central and end-user resources, and controlling costs are of roughly equal importance to customers (see Figure 2). All three rated much higher than retaining high-quality staff. This, however, varies significantly at a country level.

Controlling cost is the dominant issue in the U.S. and U.K., and a strong second place in France (see Figure 3). Respondents citing it as the most significant IS challenge ranged from 30% in France to 38% in the United Kingdom. However, cost containment is far less crucial in Germany and Japan, where the comparable figures were in the 13-14% range.

This finding correlates strongly with the anticipated overall country-level 1992 IS budget growth rates that survey respondents indicated, which clustered in the 5-6% range for the U.S., U.K., and France,

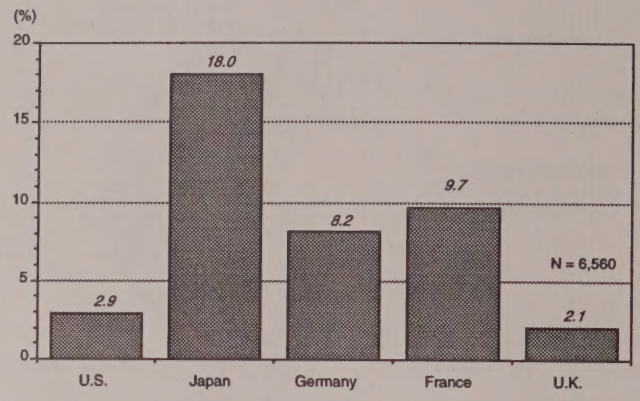
Figure 4
Broadly Positive vs. Negative Attitudes towards IS Spending by Country Markets*



Source: IDC, 1992

*Positive attitudes are sum of response rates citing as the statement best characterizing the site's overall IS spending activity, "Our needs are growing rapidly, we continue to invest heavily in hardware, software and services"; "We have about enough hardware horsepower, we now are investing mostly in software and services"; and "Most of our software is in place, but we need to increase our hardware capacities." Negative attitudes sum the response rates for the choices, "Our IS environment is basically stable and we don't anticipate major growth in hardware, software or services"; and "Our IS environment is contracting, spending will be flat to down in subsequent years." Japan responses normalized to total 100% for comparability.

Figure 5
Share of Country Markets that Consider Recruiting and Retaining High-Quality Staff to Be Top Priority



Source: IDC, 1992

but rose to over 8% in Germany and Japan. Interestingly, though, the degree of concern with cost containment may or may not translate directly into users' overall positive or negative attitudes towards IS spending.

Respondents were given five options to describe their spending activity: strong investment in all aspects; growth in software and services; growth in hardware; stable, no growth; or contracting. Figure 4 groups the proportions citing one of the first three choices as positive attitudes towards spending, and the proportions citing either of the last two options as negative attitudes.

Germany is consistent — low concern for cost containment, and high positive attitude towards IS spending. In Japan, however, a similarly low level of anxiety about cost containment stands in contrast to the highest negative attitude towards spending.

There are several possible explanations for this apparent anomaly, including the sudden transition from double- to single-digit growth in Japan. What would look like strong growth anywhere else could seem like stasis to Japanese customers.

Moreover, cost control was only one option offered to respondents as the single most important area of focus in 1992. In other words, cost control may indeed be very important to Japanese users, but other issues are even more pressing. For many sites in Japan, staffing is such an issue.

In general, retaining high-quality staff is a non-issue in the U.S. and U.K., where only 2-3% cited it as their primary focus over the next year, and only moderately important in Germany and France, with 8-10% of the survey base citing the staff issue. In Japan, however, the ratio leaps to 18% (see Figure 5).

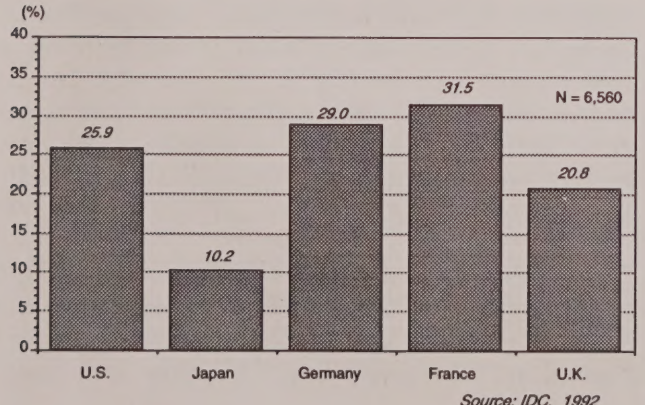
The higher level of angst in Japan almost certainly flows from the national shortage in software development personnel. MITI has estimated that the shortfall between supply and demand of development staff reached 150,000 in 1990, a number equivalent to 25% of existing personnel. By 1995, the shortfall is expected to exceed 500,000.

Technology Implementation

This shortage in qualified IT personnel in Japan has arguably contributed to a much more conservative approach towards new IT technologies. In Germany and France, the proportions stating that they often adopt new technologies in hopes of dramatically improving IS productivity ranges from 29-32%, and in the U.S. and U.K. still reaches the low-to-mid 20s. The ratio in Japan is a very low 10% (see Figure 6).

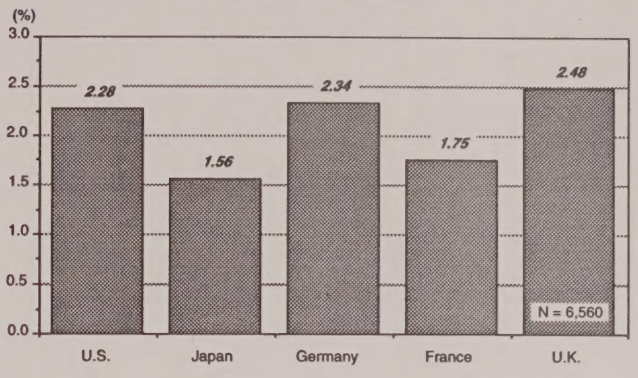
Another area with a significant degree of variation among the five countries is the amount of central management of IT resources. Respondents were separately asked whether PCs and workstations, LANs and/or departmental systems, and telecommunications were fully, partially, or not at all under the site's central management.

Figure 6
Share of Country Markets that "Often Adopt New Technologies to Improve Productivity"



Source: IDC, 1992

Figure 7
Degree of Central IS Management of PCs and Workstations, LANs and/or Departmental Systems, and Telecommunications by Country Markets*



Source: IDC, 1992

*Respondents were asked, "Which of the following areas are currently either fully or partially under your site's central IS management: personal computers and workstations; LANs and/or departmental systems; and telecommunications (PBXs, long-distance lines, etc.)?" The figure averages the results of the three subquestions, with a weighting of 3 for "fully centralized" and of 1 for "partially."

Figure 7 averages the results, with "fully centralized" sites given added weighting. The U.K. and German bases were the most likely to be centralized, followed closely by U.S. respondents. Sites in France and Japan, on the other hand, are much less likely to control their desktop devices, distributed systems, and communications infrastructure.

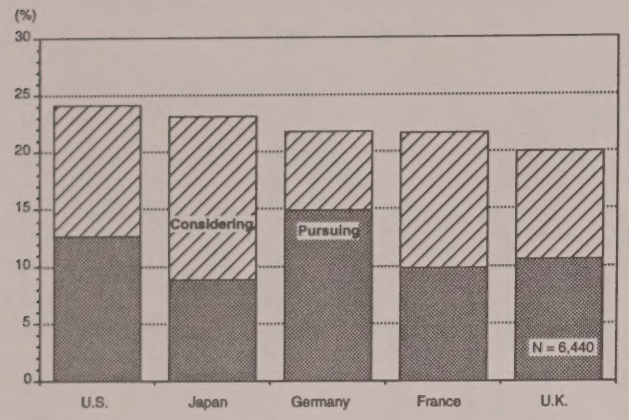
But for all the variations by country, the survey results are consistent in at least one area: everyone's got problems, no matter how different the problems may be. It should come as no surprise, then, that users turn to outsiders for help at a remarkably consistent rate. As Figure 8 shows, the minor discrepancies among the five countries in current use of systems integrators are erased when the proportions considering using systems integrators are added to them.

Open Systems/Unix

The siren song of "open systems" has lured users worldwide. While over half of the survey base still lashes itself to the proprietary mast, half of the respondents in the U.S., and over half in Germany and France, stated that their organization was actively pursuing an open systems strategy (see Figure 9). Japan recertified itself as the most exceptional group of users, with three-quarters eschewing open systems.

(continued next page)

Figure 8
Share of Country Markets Using or Considering Use of a Systems Integrator



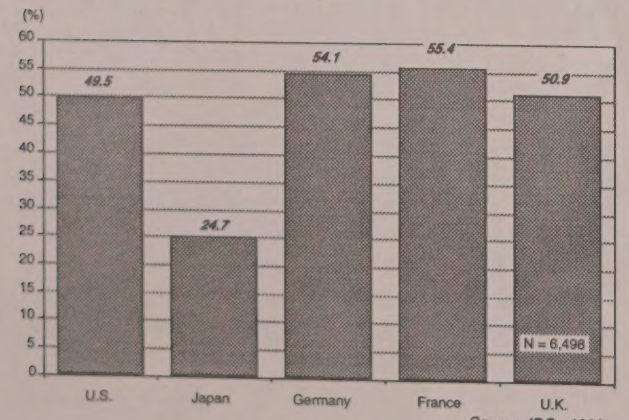
Source: IDC, 1992

But what do users mean by open systems? The Unix vendor community has attempted to establish an identity between Unix and "open systems," but with less than complete success. Only half of the respondents who claimed to be pursuing an open systems strategy stated that they were implementing it with a standardized operating system; the remainder believed that standardized enterprisewide communications and so-called middleware — common development tools, programming languages, and database software — would suffice to fulfill their commitment to openness.

Moreover, Unix advocacy varies significantly by region (see Figure 10). Europe is the most committed to Unix. Respondents in Germany, France, and the U.K. were remarkably consistent, with 41-44% stating that they were actively pursuing a Unix-oriented strategy. In the U.S. the ratio drops to 30%. And in Japan only 13% were currently astride the Unix horse.

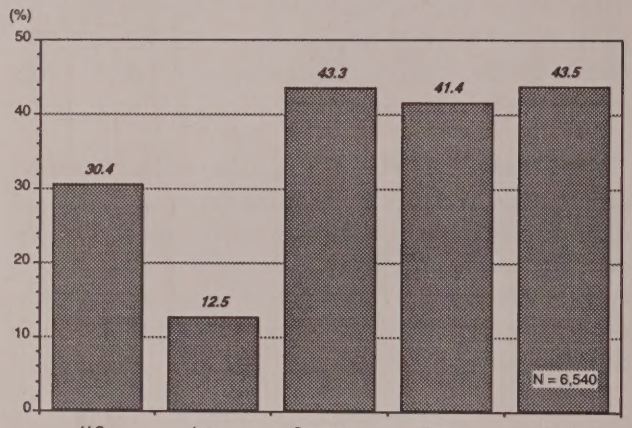
The operative word, though, may be "currently." Aware of the growing shortage in programmers that is feeding users' concerns about hiring and retaining staff, many leaders in the Japanese government and computer industry have been touting Unix as a possible escape hatch. Probably as a result, the proportion of the Japanese respondents who are not now pursuing but are considering a Unix strategy is by far the highest of the five countries, surpassing 20%.

Figure 9
Share of Country Markets Pursuing an Open Systems Strategy



Source: IDC, 1992

Figure 10
Share of Country Markets Pursuing a Unix-Oriented Strategy



Source: IDC, 1992

PC Environments

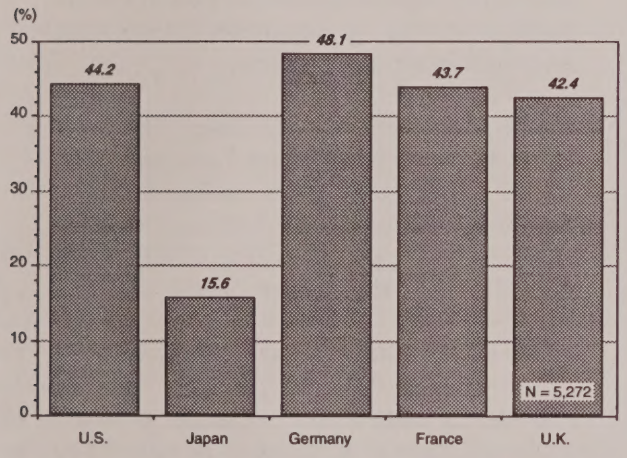
The shift to the desktop has been the single most significant revolution in computing in the past quarter century. Within this revolution several key developments have redefined its direction and added to its momentum. Two of the most significant have been more user-friendly interfaces — which for many in the DOS world has meant MS-Windows — and local area networking.

As of the end of 1991, MS-Windows was running on a strong 24% of DOS-based PCs in the survey base. Remember reading about the Microsoft employee meeting in 1981 where a programmer put up a chart

showing that by the mid-1990s Bill Gates would be employing every inhabitant of the state of Washington? With survey respondents expecting that by the end of this year the proportion in the five countries will rise to 41%, maybe we should have hired that fearless forecaster at IDC.

Windows penetration reached 33% of the PCs in the French survey base by last December 31, 25% in the U.S. base, and 20% in Germany and the United Kingdom (see Figure 11). But despite Microsoft's presence in Japan since the beginning of the PC revolution, only 3% of the PCs in Japan were Windowed at yearend 1991. NEC's proprietary PC standard has prevented Microsoft from establishing the type of software domination that IBM's early largesse has allowed it elsewhere.

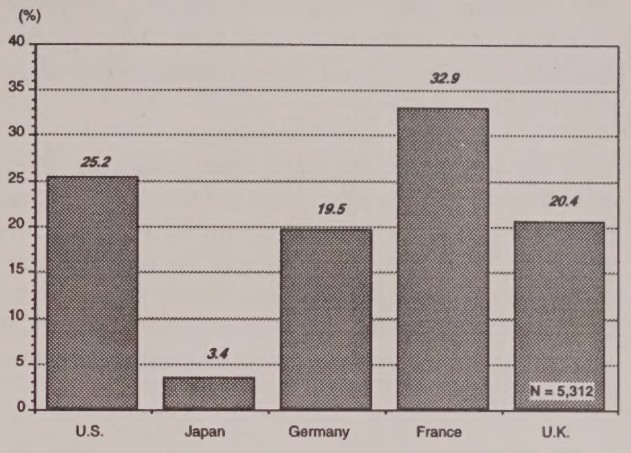
Figure 12
Country Percent of IBM-Compatible PCs on a Local Area Network as of 12/31/1991



Source: IDC, 1992

The penetration of LAN technology is even more impressive, with survey respondents reporting that 42% of their PCs were on local area networks by yearend 1991. The ratios for the U.S., U.K., France, and Germany were roughly comparable, ranging from 42% in Britain to 48% in Germany (see Figure 12). Japan once again trailed, but its low 16% still represented major growth from virtual insignificance for LANs a year earlier.

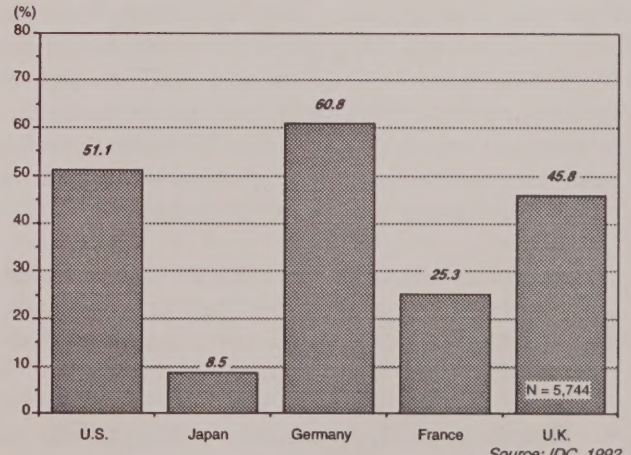
Figure 11
Country Percent of IBM-Compatible PCs Running MS-Windows as of 12/31/1991



Source: IDC, 1992

The Microsoft of LANs, much to Bill Gates's chagrin, is Novell. Its domination, however, is much more subject to the vagaries of geography (see Figure 13). The 40% mean for support of Novell Netware in the five countries masks sharp discontinuities between Germany, at 61% of the survey base, down to 25% in France, even before reaching Japan, where over three-quarters of the base do not support any special network operating system, whether Netware, Microsoft LAN Manager, IBM LANServer, Banyan Vines, or other options.

Figure 13
Novell Netware Support by Country*



Source: IDC, 1992

*Asked "Which of the following network operating systems do you currently support for PC-based local area networks," respondents were given the choices of Novell Netware, Microsoft LAN Manager, IBM LAN Server, Banyan Vines, other, or none. Multiple responses were allowed.

Fighting European Superstitions

"It's a complex fate, being an American," the novelist Henry James once opined, "and one of the responsibilities it entails is fighting a superstitious valuation of Europe."

A lot of Americans have been changing their valuation of Europe over the past couple of years, spurred by the unexpected geopolitical revolution that ended the Soviet empire and the planned economic, quasi-political revolution that is supposed to reach its first milestone this December 31. These U.S. observers may, however, be simply exchanging new superstitions for old.

No one has yet written a best-selling novel devoted to Europe-bashing along the lines of Michael Crichton's fulminations against Japan, but many commentators would agree with Lester Thurow's admonition in his recent *Head to Head* (p. 75): "As the world's largest market, the House of Europe will be writing the rules of world trade in the twenty-first century, and the rest of the world will simply have to learn to play their economic game."

What will this mean for U.S. IT vendors doing business in or planning to enter the European market? Will Fortress Europe lower the drawbridges and deepen the moat separating non- European companies from their customers?

IDC's 1992 research offers some intriguing insights into the future of the IT market in Europe. From it we learn that European users are making strategic decisions and spending plans as members of host environment markets; of vertical markets; and of country markets. With significant and enduring differences among Europeans, it will remain true for years to come that, in many important ways, **there is no such thing as a European IT market.**

The survey revealed some areas in which all users are alike. However, even within apparent consensus, important differences can exist among country markets. Thus:

- French sites were much more willing to sell the family jewels to professional services providers, with almost three-quarters of the potential base willing to transfer most or all IS activity or strategic applications. Germans, on the other hand, have a higher likelihood of hiring integrators on a one-time project basis or for relatively minor projects.

- Germans are strongly committed to open systems in all senses of the word. The British and French are more picky.

Indeed, the closer one looks at the survey results, the more impressed one becomes at the extent of country differences:

- The Germans are by far the most positive on IS spending, whether overall, for hardware, or for software and services. Controlling costs is viewed as less of a challenge than in other European countries.

- French sites were much less likely to exercise central management over their PCs and workstations, LANs or departmental systems, and/or telecommunications.

- British users have become stodgy. Their attitudes towards IS change are the most conservative in the survey base outside of Japan, and they are less receptive to training their staff in new approaches like CASE or the client/server paradigm.

Und so weiter, et ainsi de suite, and so on.

This means that, unlike consumer products, IT products will have to continue to be tailored to distinct user priorities in individual countries. The status quo ante 1992 will likely remain in place a good deal longer in IT markets than in other areas of the European economy.

And to the extent that priorities change, it will be because larger companies can expand their scope across Europe. In competing for this business, the advantage will go to European-wide IT vendors with products built on de jure and de facto standards. Today, the only European-wide vendors and the only de facto standards are made in America.

Now, about the superstitious valuation of Japan....

Patrick C Bellamy

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR SEPTEMBER 5, 1992 • VOL. 27, NO. 21 Published continuously since 1964.

Latin America Offers IT Suppliers Incremental Growth

Computer companies are feeling the triple pinch of corporate belt tightening, recession, and product cycle-related uncertainty. Most suppliers are happy to simply retain market share. For some, growth is out of the question. Others seek expansion in niches like notebook PCs and network integration.

Their strategies are few: steal share within core markets. Expand product lines to tap faster-growing niches. Or, broaden geographic coverage. With hardware systems sales across all categories cratering (at worst) and holding flat (at best), increasing sales in new markets is an increasingly attractive solution.

But where? After years of double-digit growth, the U.S. market is showing only 3-4% growth. Despite and due to the 1992 EC initiative, Europe markets are generally depressed. Of the major industrialized countries, only Japan is showing growth rates over 5%.

As a result, newly-industrialized countries in Asia and Latin America (LA) are garnering more attention than ever. In 1991 Latin America comprised barely over 2% of the worldwide hardware market. The region is expected to substantially outperform the worldwide IT market over the next five years for the following reasons:

- Protectionism is on the decrease. Latin American governments have acknowledged that free trade is the quickest route to fiscal independence. For IT suppliers that means more joint ventures and less-rigid trade restrictions.

- LA economies are stabilizing. As pro-business policies implemented over the past two years take root, IT markets are thriving. Significant infrastructure investments — the most pressing need — will drive IT growth for the near term.

- Overall, LA-U.S. trade is already on the rise. U.S. exports to Latin America grew 18% in 1991 to reach $58 billion. The expected North America Free Trade Agreement (NAFTA) will increase inter-Americas trade. Various inter-region agreements also serve to increase overall business activity.

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Latin American Growth Opportunities 1
LA Country Profiles 3
LA Hardware Markets by Country 6
Being in Brazil Isn't Enough 8

LA: Bright Future?

In the 1990s, Latin America is finally beginning to show signs of living up to its promise. After years of political and economic mismanagement, Latin American countries are turning away from the protectionist trade polices of the last decade and opening their borders. Governments bent on positioning their countries for the 21st century are adopting privatization and free-trade policies.

Across the region, hundreds of formerly nationalized companies are now in the hands of private owners who require massive imports to overhaul them. Consumers, stifled by a decade of import restrictions, may be ready for a foreign-goods buying binge.

Government spending is also increasing as the region starts to rebuild its crumbling infrastructure. The drop in interest rates in the United States and

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other creditor countries has enabled Latin countries to raise billions of dollars in the Eurobond market to finance their economic expansions.

Big Gains for IT Suppliers

Once restricted by tough protectionist barriers and unstable economies, worldwide IT suppliers are positioning themselves to take advantage of the new opportunities in Latin America. Local companies, scrambling to become globally competitive, are eagerly responding.

American companies, by far the biggest investors in the region, have the advantages of proximity and established distribution networks over European- and Asian-based suppliers. The Americas have been trading partners throughout most of this century, and after surviving the debt crisis, their ties are tightening further with the North American Free Trade Agreement NAFTA, which may form the basis for hemispherewide free trade. U.S. officials are looking to Chile as the next coutry to include in a trade agreement.

Companies based in the United States have won many new contracts in Latin America. Among them are the following: IBM — an $8 million contract to computerize Argentina's tax system; AT&T — a $130 million contract to link 54 cities in Mexico with 8,000 miles of fiber optic cable; and GTE — major contracts for Venezuela's newly privatized phone system. Aldus earns 5% of its total overseas revenue from Latin America.

Some Barriers Remain

While the LA outlook is generally good, a host of question marks may become barriers to long-term growth. The NAFTA agreement is yet to be finalized. Current pro-business policies are subject to political pressures. A return to protectionism might happen quickly in any given country. Most Latin countries still lack an IT infrastructure that will support a mature market. And finally, protection of intellectual property is in its infancy.

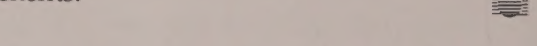
Indeed, the economic health of the entire region is tied to such questions. In turn, the IT industry in Latin America is in part a function of the region's overall health. However, development of Latin IT markets will take place slowly until protection of intellectual property rights is a certainty.

Intellectual Property Rights

Piracy in Latin America has been notoriously easy, risk-free, and lucrative. But as the region moves towards freer world trade, intellectual property rights (IPR) protection is essential. Led by Mexico and to a lesser degree Chile, countries are realizing that they must adopt strict IPR protection in order to participate in the world economy. Property protection is now slowly being implemented, opening the way for full copyright and patent legislation.

Mexico's patent law went into effect in June 1991 and is generally well received, but Chile's major new patent legislation, which took effect September 31, 1991, is criticized for not providing comprehensive coverage. Columbia, followed by Venezuela, are the first Andean Pact countries to adopt the recently passed Decisions 311 and 313, ending prohibition on patents and providing limited copyright protection.

Argentina has a draft-reform package patent in Congress, which many hope can retain its key protection features as it wends its way to becoming law. Brazil, on the other hand, has a patent draft in the legislature with provisions that are so weak they make it look like a Brazilian attempt to placate the United States. The U.S. Trade Representative has issued an intellectual property watch list to warn those countries with poor IPR protection, for either patents or copyrights, that they risk losing important trade benefits.



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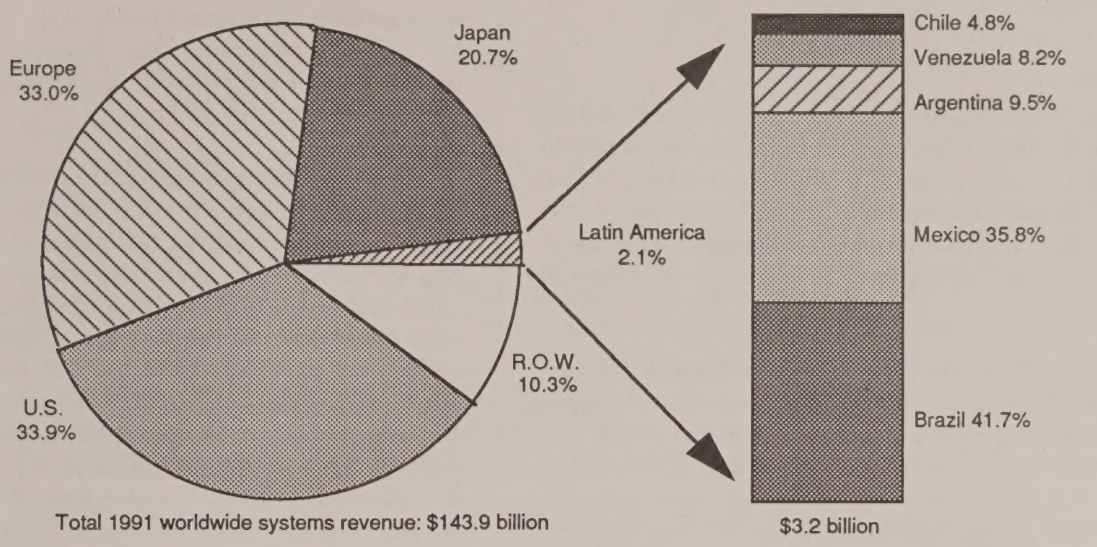
1991 Worldwide Systems Revenue by Region



Source: IDC, 1992

Latin America Country Overview

Within the substantial economic revitalization in Latin America, individual countries are at different stages of IT development. Following is a brief overview of the current economic and political state of each of the countries included in IDC's 1992 study, *Latin America Computer Market Dynamics*:

Argentina

Driven by budget cuts, privatization schemes and deregulation, Argentina's economic stabilization efforts are making steady progress. After a meager 0.4% rise in 1990, GDP grew a healthy 5.0% in 1991 and is expected to grow 6.0% in 1992. A major debt reduction agreement was reached with commercial bank creditors this year, making it possible for Argentine firms to borrow from international credit markets for the first time since 1982.

The Menem administration continues market-driven economic policies. Privatization is nearing completion. Inflation is being held down to 2% a month, sparking consumer demand for durable goods, services, and construction. And the government, intent on improving tax collection from business, has raised the value-added tax from 16% to 18%. Also, while the strength of the peso has caused a drop in export earnings, it has been offset by large capital inflows; $5 billion entered Argentina in 1991, ending years of capital flight. The Argentine stock market was one of the most lucrative in the world in 1991.

Argentina's overall economic health is mirrored by strong growth in the domestic computer industry. PCs and professional services grew fastest, followed by WAN and LAN hardware, business communication services, and multimedia applications in consumer-related industries.

Brazil

Although Brazil is joining other Latin American countries in economic reforms, its political problems are hampering growth. Administrative reforms have become mired in Congress as the country's corruption scandals have led to threatened impeachment for President Fernando Collor de Mello.

Nonetheless, reforms and liberalization are going forward, and financial markets, except for the stock market, are steady. After only marginal growth in 1991, GDP is expected to expand about 2.3% in 1992. Expecting at least $1 billion of new foreign investment as a result, the government ended the state monopoly on semipublic services, such as data transmission, cellular mobile phones, and the installation of the telecommunications infrastructure.

The biggest change in the Brazilian computer industry has been the change in the "Informatics Law of 1984." As a result of the changes, foreign corporations were allowed to own up to 49% of Brazilian-based firms. In addition, requirements for locally

(continued next page)

built components were eliminated, opening the way for imports.

Mexico

As President Carlos Salinas continues to maintain strong political control, both inflation and access to credit should continue to improve in Mexico. The inflation rate is expected to drop to 12-13% by the end of the year and investment to rise 8-10%, while new, direct foreign investment could exceed $5 billion in 1992.

Real GDP was expected to grow 4.0% in 1992 (vs. 3.6% in 1991), driven mainly by investment spending of businesses preparing for NAFTA. But while Mexico waits for NAFTA implementation and worries over the consequences for the trade agreement should President Bush be defeated in the November presidential election, the country's economy is slowing dramatically. In the second quarter of 1992, preliminary estimates show GDP grew a weak 1.5%, down from 4.2% growth in the first quarter. Estimates for the first half of 1992 have now been revised to 2.8% growth.

Mexican firms building international alliances will boost the country's overall IT investment. After a decade of minimal reinvestment, several segments of the Mexican economy will benefit, including financial and government sectors. The Mexican communications services market will be the fastest-growing sector over the next five years. Privatized commercial banks should spend heavily on telecommunications systems during 1991-1995.

With the signing of the North American Free Tade Agreement, foreign investors will be putting more emphasis on integrating local operations with U.S. and Canadian businesses, requiring more sophisticated systems. And stricter North American content rules expected to accompany the agreement will give equipment providers from the U.S. and Canada an advantage over non-North American competitors. Already, Telmex has traditionally purchased almost exclusively from the subsidiaries of Sweden's L.M. Ericsson and France's Alcatel, known in Mexico as Alcatel Indetel. AT&T has already made important inroads, supplying fiber optic and terminal equipment to Mexico.

Venezuela

President Carlos Andres Perez's economic adjustment program is on track, but the political tensions that resulted in February's attempted military coup need to be resolved and the government's credibility restored. Strides are being made toward a true market

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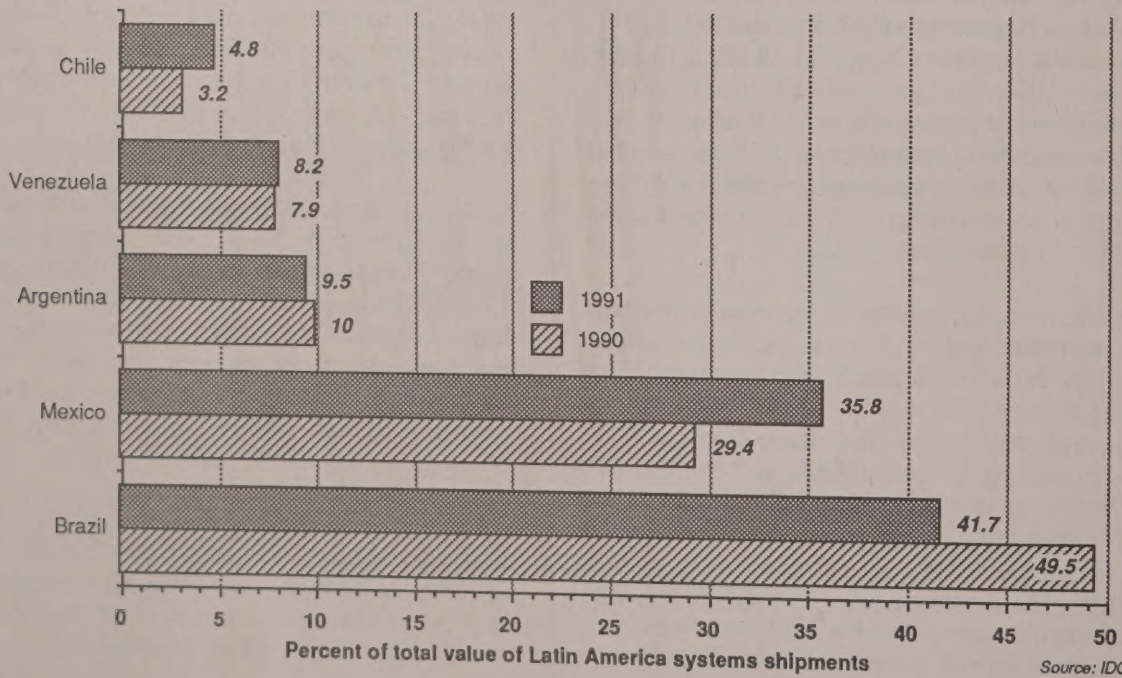
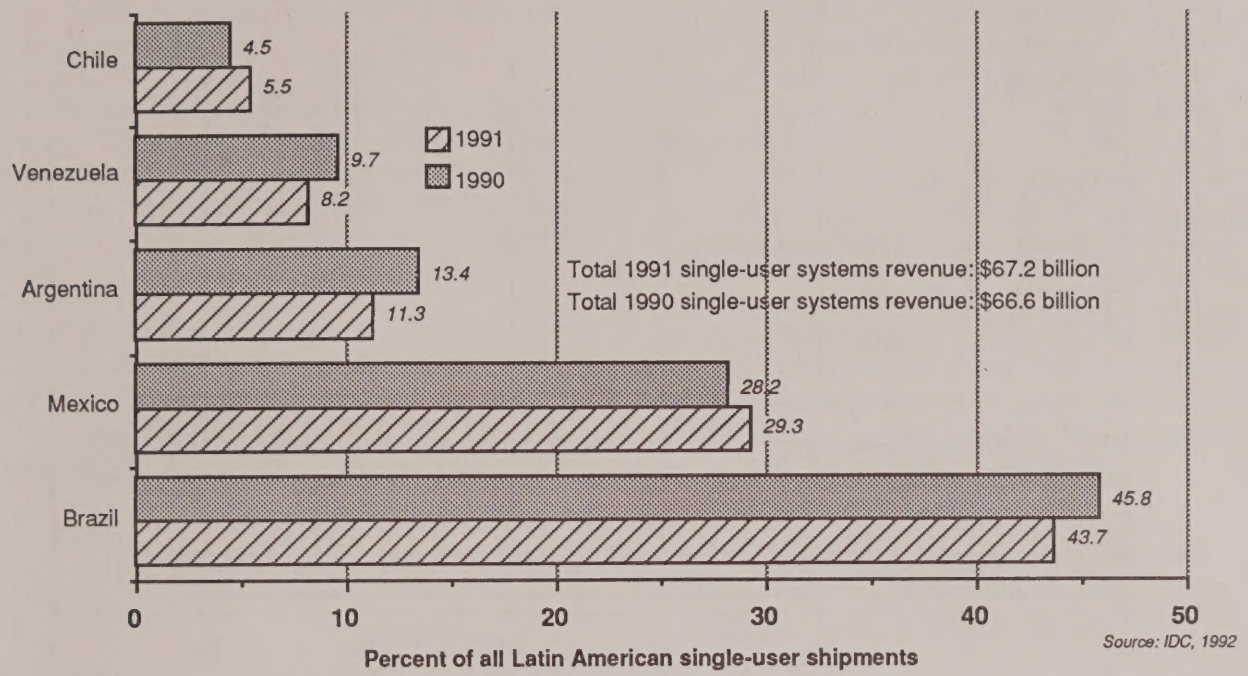
1991 Latin American Percent of Systems Revenue by Country



Source: IDC, 1992

1991 Latin American Percent of Single-user Systems Revenue by Country



economy, and the bilateral free-trade agreement with Columbia offers increased opportunities, that will expand dramatically with the proposed incorporation of Mexico in 1993.

After growing a record 10.4% in 1991, real GDP growth will slow to 4-5% this year, affected by cuts in the state oil company's budget, postponement of megaprojects, investor caution, and high inflation. 1992's rate of inflation should hit 30%, just under 1991's 31% rate, but fiscal reform and budget deficit control could slow inflation to 20-25% in 1993.

Foreign investment, stalled since February's coup, should pick up with the return of political stability to reach $1 billion this year, an increase of 59% over the $405 million invested in 1991. For example, GTE, which owns 40% of the national phone company, CANTV, will invest $500-700 million yearly through the year 2000.

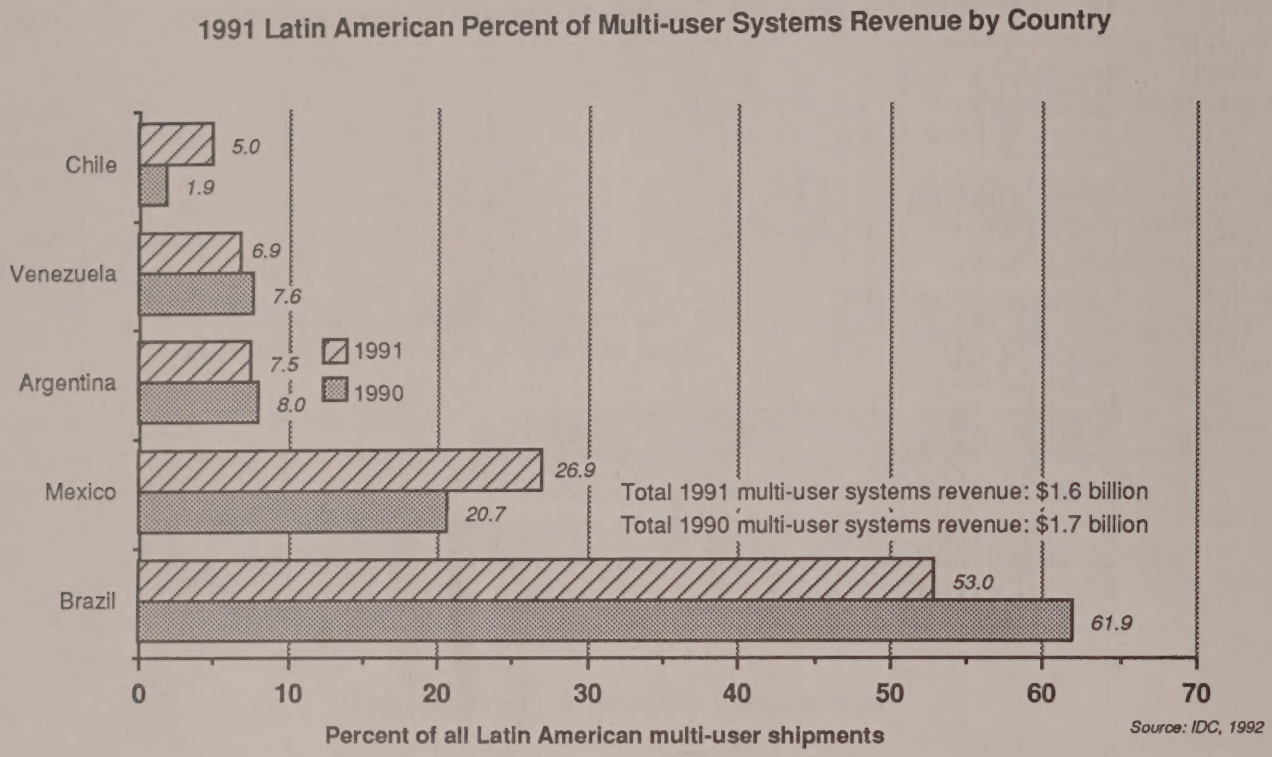
Chile

Chile, which ended military rule only two years ago, is maintaining its political stability with the consensus government of President Patricio Aylwin, who came to power in 1990. It continues to have widespread support. In June, the country held municipal elections for the first time in two decades.

With exports driving growth, GDP grew 6.0% in 1991 and is likely to increase by at least 6.5% in 1992. At the same time, inflation fell to 18.7% from 27.4% in 1990 and should go no higher than 15.0% this year. Exports increased 7.5%.

Chile's first bilateral trade agreement was made with Mexico in 1991 and was followed in 1992 by an accord with Venezuela. A trade agreement with Argentina is currently being negotiated, and Chile is trying to advance to a trade agreement with the United States.

Chile has a modern communications infrastructure already in place throughout the country, providing public X.25 data networks and private digital networks. Cellular phones are widely used, and facsimile machines are commonplace. While the government is currently working on new legislation that will open the communications market to competition, communications companies are making significant investments. The recently private long-distance carrier, ENTEL, plans to install a fiber optic network and expand satellite communications costing more than $500 million over the next eight years. The largest local communications services provider, CTC, is investing $1.2 billion during 1990-1997, which will account for 85% of all investment in the communications sector in that time frame.



Latin AmericanHardware Market Overview

Almost $144 billion dollars worth of computer hardware was shipped worldwide in 1991. The five largest Latin American countries combined — Argentina, Brazil, Chile, Mexico and Venezuela — shipped systems valued at $3 billion to gain just over 2.0% of the worldwide market. Compared to 1990, Latin America, along with the other regional markets, gained value market share at the expense of the United States and Europe, which lost 2.0% and 1.5%, respectively, as their economic downturns continued to hamper IT spending.

Brazil again led the region in shipment value, but probably for the last time. Brazil's 1991 value market share dropped by almost 8% from 1990, while Mexico's increased to just 6% behind that of Brazil. Unless Brazil can overcome its political problems and move its economic program ahead quickly, which doesn't appear likely, Mexico will become the new regional market leader in 1992 and will likely stay there beyond 1996. IDC forecasts a CAGR for total shipment value of 11% for Brazil and 19% for Mexico over the next five years.

Dividing the total systems market into multiuser and single-user value shows the five Latin American countries holding their 2.0% of the world market in both categories. They also mirror the world in the percentages spent in each category. Worldwide, multiuser systems accounted for 53.4% of total shipment value, or nearly $77 billion in 1991, and single-user systems had a 46.7% share. The market value split in Latin America is 53.6% for multiuser and 46.3% for single user systems.

The two major countries, however, have opposite computer markets. Brazil's lead in multiuser system shipments has made it the top regional IT market, while Mexico's lead in single-user shipments will pull it ahead over the next five years. In 1991, Brazil shipped 1,700 more multiuser systems than did Mexico, while Mexico shipped 109,000 more PCs.

Multiuser Systems

In 1991, Brazil shipped 2,807 multiuser systems in 1991, valued at just under $864 million, for a 53%

(continued next page)

regional market value share. Mexico, though a major multiuser market, increased its share 6%, but still came in a distant second with 27% of multiuser shipment value.

Over the forecast period, however, the dynamics will change. Mexico will gain share in the multiuser market while at the same time increasing its lead in the single-user market. Brazil is expected to show less value growth across the board than any of the five countries.

IDC forecasts Mexico to have the highest value CAGR between 1991-1996 in every multiuser category, except Unix sytems and workstations, whereas Venezuela will grow by just 0.1% more. Currently, however, Brazil shows the most interest in Unix compared with other Latin American countries as well as other countries around the world. Unix represented 60.3% of Brazil's multiuser system shipments in 1991. IDC estimates the percentage will grow to 79.3% of multiuser shipments in Brazil by 1996.

Single User Systems

Mexico owns the single-user system market in Latin America. It's 1991 share was 43% of unit shipments and almost 46% of value. IDC forecasts Mexico to gain unit share, so that in 1996, it will have a solid 46% of the single-user market in both unit shipments and value. Brazil, in second place in 1991 with 28% of both shipments and value, will have the same 28% share in 1996, and the other countries will still be forced to share the remaining 24% between them.

Latin American Personal Computer Market — 1991, 1996

	Shipments		Value $M		CAGR 1991-1996	
	1991	1996	1991	1996	Units	Value
Argentina	90,500	234,000	165.0	480.0	20.9%	23.8%
Brazil	201,500	555,000	395.0	1,060.0	22.5%	21.8%
Chile	47,700	135,000	62.6	180.0	23.1%	23.5%
Mexico	310,772	974,000	641.9	1,731.1	25.7%	21.9%
Venezuela	66,466	163,000	136.3	300.0	19.7%	17.1%
Total	716,938	2,061,000	1,400.8	3,751.1	23.5%	21.8%

Source: IDC, 1992

Latin American Multiuser System Market — 1991, 1996

	Shipments		Value $M		CAGR 1991-1996	
	1991	1996	1991	1996	Units	Value
Argentina	1,340	3,225	122.6	193.0	19.2%	9.5%
Brazil	2,807	5,610	863.7	1,098.0	14.9%	4.9%
Chile	563	1,076	81.5	111.5	13.8%	6.5%
Mexico	3,107	7,680	438.9	847.0	19.8%	14.1%
Venezuela	1,172	3,067	112.2	185.3	21.2%	10.6%
Total	8,989	20,658	1,618.9	2,434.8	18.1%	8.5%

Source: IDC, 1992

Just Being in Brazil Won't Be Enough

IT suppliers have many reasons to be delighted by the expected opening of Brazil's underdeveloped and promising IT markets in October. Brazil's IT buyers have been clamoring since 1984 for legal access to competitive IT technologies at reasonable prices.

Brazilian IT production has not kept pace with international advances for many hardware and communication products. The result is a ready market for international firms specializing in solutions based on the appropriate combination of hardware, software, and services.

The absence of free-market access has been a singular barrier to international IT companies. With that access right around the corner, suppliers must plan carefully for entering the Brazilian market. Access does not necessarily ensure success.

Suppliers seeking to enter the Brazilian market still face significant barriers. Just because they can provide cutting-edge IT (that Brazilian suppliers alone cannot) they should not expect to meet with instant success. Companies would be unwise to discount or ignore local companies based on the outdated technology the local players have offered in the past.

No markets are truly open. But despite the proposed changes in the market reserve policy, Brazil will likely remain much less open than almost all major worldwide IT markets for several years. While the announced policy changes have yet to be fully defined, successfully entering Brazil may still be an uphill battle.

After October, IT imports will be legalized, but tariffs on imported products are expected to remain very high. They will be reduced slowly over several years, effectively continuing preferential treatment for local companies and extending demand for contraband equipment.

The impact of the changes on government- and state-owned enterprise procurement remains to be seen. But it is likely that local firms will have the upper hand. Given the extent of state-owned enterprises in the Brazilian economy (few of which have been privatized to date), the role of government IT procurement is critical to the overall health of the market.

The end of the market reserve policy is a two-way street. Entrants will have an easier time bringing new products to market. Local companies will too.

Brazil's IT market is dominated by suppliers who have enjoyed 15 years of protection from outside competition, six of whom had 1991 sales of over $60 million. Most local suppliers have forged deep financial and political relationships, and have developed solid distribution and service organizations. Their installed based dwarfs that of outsiders.

These local firms will be in the best position to migrate their customers to more modern IT platforms. Many will transform themselves from technology manufacturers to solution providers, combining their sales and service networks with imported technology.

The largest Brazilian suppliers have already formed partnerships with major outside firms. Many smaller companies are considering the same. Both seek to upgrade their current product sets or hope to sidestep direct competition with outside firms.

The sheer size of the Brazilian market would prompt many foreign companies to establish a Brazilian subsidiary at the first sign of a more open market. That strategy may serve companies well in the future. However, given the many legislative and procurement policy uncertainties and the strength of the local players, developing Brazilian partners now and worrying about market share later may be the wisest entry strategy.

Paul J. Pastrone
Director
Latin American Research

Midrange Review and Forecast

THE GRAY SHEET

Computer Industry REPORT

DOUG McLEOD, EDITOR | OCTOBER 2 1992 • VOL. 27, NO. 22 | Published continuously since 1964.

Making Money in the Molten Midrange: If Unix Is Not the Answer, What Is?

Competition in the midrange has been intensifying for years. Midrange suppliers are burning up, and out. The bankruptcy of one former standout (Wang), a billion-dollar loss at another (Digital), and the sale of a third (TI's multiuser systems business to HP) indicate how vicious the midrange has become.

The midrange is smack in the middle of the most significant redefinition in its history. Proprietary architectures are under siege from standards-based Unix that promises users greater freedom for less hardware expense. Installed bases of the de facto standards — AS/400 and VAX — face increasing pressures from less expensive (purchase price, anyway) substitutes. Specifically:

- Unix-based systems are on top of the midrange. Worldwide shipment values grew by 14% in 1991. But after years of dillydallying, Unix's midrange leadership (54% of 1992 units worldwide, 25% of 1992 revenue) is split among dozens of Unix flavors.

- The worldwide AS/400 systems market is not growing as quickly as Unix ("only" about 9% this year), but is almost as large in real terms ($6.4 to $8.1 billion for Unix in 1991).

- The VMS base is languishing. Sales declined last year (by 5% worldwide) with no recovery in sight for 1992 (off another 5%).

- Yet no one is making money selling Unix. Simply covering ongoing development costs is a major challenge for Unix suppliers.

- Alternative (to proprietary) technologies continue to gain momentum. Univel's UnixWare will offer a more robust server environment to Novell users. NT may pose a threat to some midrange players by riding on Windows' distribution and installed-base shoulders.

Unix has delivered some of the vaunted promises of Open Systems — commodity hardware, greater interoperability, and user control. Unix suppliers continue to make PR hay trumpeting those benefits — often somewhat prematurely.

As a result one issue, above all others, will determine the shape of tomorrow's midrange: integration costs. Will a company be better off paying more up front (AS/400) for instant integration across applications and hardware, or will a lower purchase price and more back-end tinkering (Unix, NetWare) pay off with faster applications, greater functionality and increased control over customization?

IDC's traditionally conservative forecasts are loath to assume the wholesale substitution of emerging products with even younger products. NT's strength will probably remain on the desktop, and Unix will continue to grow in the midrange. PC-LAN-based solutions will chip away at the low end of the midrange. Among suppliers of proprietary systems, only Digital's and IBM's proprietary midrange systems will grow.

How will the other suppliers respond? For midrange companies, making money means earning less on every subsequent sale. And while unit sales in the midrange may grow, revenues won't. Growing a midrange business demands a carefully constructed strategy that works as ASVs continue dropping inexorably.

Avoiding profitless growth requires excellent service and support, strong indirect channels that really add value, and innovation on standards such as SMP scalability, cost of operation, and price/performance. In the pages that follow, we examine how leading midrange suppliers are honing their strategies.

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5 Speen Street, Framingham, MA 01701 / (508) 872-8200

Midrange Computer Supplier Company Profiles

Midrange computer suppliers are in the midst of a significant transition spawned by the need to gravitate toward one of the two poles around which competition in the multiuser computer industry has intensified: supplying technology (processors, components, systems) or solutions (customized services).

For some (HP and Sun, for example) building midrange computers is building technology. Others (Wang, most notably) focus on developing solutions for their customers. The largest midrange competitors have very significant investments in both strategies, and face a very difficult separation of lines of business. Following is an update on the largest midrange suppliers and architectures.

IBM AS/400

One of IBM's most notable successes over the past three years can be found directly in the middle of its vast product line: the AS/400. The AS/400 is IBM's most important midrange product.

The first half of 1992 has been good for IBM's AS/400 organization, Applications Business Systems (ABS). The new 1992 AS/400 models — the E models — shipped in the second quarter, contributing to a significant revenue spike. Overall, ABS will grow by as much as 10% in 1992, and will increase by as much as one point of midrange market share.

Recent announcements have significantly improved the AS/400's market position in three ways: storage, user-based application software pricing, and services. Second-half growth will be fueled by the AS/400 RAID 5 (redundant arrays of inexpensive disks, level 5) announcements. Although IBM was late to announce a RAID 5 solution for the AS/400, it was early to deliver. Moreover, the product is simpler, more expandable and more cost effective than many midrange RAID 5 offerings.

User-based pricing that lowers users' entry-level prices is being offered for the first time on the AS/400 on two important application packages: ImagePlus/400 and PC Support/400. User-based pricing will be offered on other applications soon. Interestingly, ImagePlus/400 is an application owned not by ABS but by IBM's Application Systems line of business. Near-term changes in the company's software pricing practices are possible. ABS has indicated that it will introduce a facility in the first quarter of 1993 to help users track their inventory of user-based licenses.

IBM's AS/400 service capabilities, offerings, and merchandising are the midrange's best. Six levels of support — each packaged to offer a different level of attention — are available from AS/400 experts (ABS recently reorganized and consolidated its services capabilities to Rochester, MN, the primary AS/400 R&D site). All six services come with a satisfaction guarantee. Local field, sales and marketing personnel remain in place for on-site services.

If the AS/400 has an Achilles heel, it is availability. The loss of a CPU still necessitates a hard stop and reboot with remaining resources. Improvements will be required if the AS/400 is to maintain parity with the midrange market.

IBM RS/6000

The RS/6000 is IBM's midrange darkhorse. In 1991, worldwide RS/6000 equipment revenue grew to $1.4 billion, a 73% increase over 1990. In stark contrast to prevailing workstation industry trends, approximately 70% of RS/6000 sales are commercial applications. The RS/6000 is increasingly IBM's other midrange product.

In 1992, RS/6000 revenue will total approximately $2.0 billion. The gains will come primarily at the expense of Sun, Digital, Sequent, Pyramid, and NCR (Tower). Despite its commercial success, the RS/6000 occupies a niche in OLTP environments, primarily as store controllers, data collection points, and intermediate database engines. IBM will continue pushing

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The Battle for Leadership of Tomorrow's Midrange

Successful companies in tomorrow's midrange may be only bit players today. Likewise, today's leaders may falter. Some already have. A major determinant of the shape of tomorrow's midrange will be the network of relationships that develop between chipmakers, OS suppliers and major OEMs. To date no single architecture has attained enough momentum to guarantee leadership. The AS/400, Alpha-Intel/NT, Sparc/Solaris are close.

Company	Chip	OS	Comments
IBM	AS/400	OS/400	Base growing 5% annually. Keep P/P pace with RISC systems?
IBM	Power	Unix	Fastest-growing RISC/Unix market. Pink future?
Apple	Power	Pink	Server paucity limits applicability. RS/6000 client?
Groupe Bull	Power	Unix	Amidst MIPS to IBM transition. Is building a GCOS Unix possible?
Wang	Power	Unix	Difficult VS to AIX transition. Why not just buy from IBM?
Olivetti	Alpha	NT	Too many (MIPS, Stratus, Pyramid, NetFrame) platforms?
Digital	Alpha	NT	Aggressive Alpha upgrade plans. OEM support for Alpha?
HP	PA	HPix	Successful RISC upgrade complete. PA critical mass?
Stratus	PA	Unix	Third platform in three years. PA transition strategy?
Hitachi	PA	Unix	How committed to HP?
SNI	Intel	Unix	S-N integration done. Last European plumb for technology suppliers?
NCR/AT&T	Intel	Unix	Can a minicomputer sell servers? Differentiation strategy?
Data General	Intel	Unix	Downsizing to sell servers. Vertical market differentiation?
Sequent	Intel	Unix, NT	Low-cost Unix. Differentiators in now-crowded market?
Dell	Intel	NT, OS/2	Lowest-cost Intel server supplier. Channel and service questions.
Compaq	Intel	NT, OS/2	Same midrange questions as Dell. Support other platforms?
AST Research	Intel	NT, OS/2	Likewise. PC suppliers must broaden support for midrange viability.
Tandem	R3000	Guardian	High-availability competition. Long-term MIPS viability?
Sun	Sparc	Solaris	Strong workstation momentum. Needs more OEM support.
Fujitsu	Sparc	Unix	Most important Sparc OEM. How scalable is it?

Source: IDC, 1992

the AS/400 as the optimum low end and midrange OLTP platform.

Nonetheless, IBM remains committed to growing the RS/6000's commercial presence. In late 1992, it will announce CICS on the RS/6000. Native CICS will significantly advance the RS/6000's acceptance as a mainstream OLTP platform.

Digital

Digital has floundered badly in the midrange, previously its most successful segment. The company's core technology is undergoing the most significant cycle-related transition in history. The company's services group is large and successful. Nonetheless, midrange revenues in 1991 dropped to $5.1 billion from $5.4 billion in 1990, contributing significantly to the company's recent losses.

The company's response centers around Alpha—the RISC chip announced in January. A host of hardware, software, services and upgrade announcements that focus on Alpha technology form the foundation of Digital's attempt to regain midrange market share.

Alpha systems will not be available until 1993. As a result, Digital is attempting to sell systems today while still creating excitement and demand for the new systems. Migration is the key. In July Digital extended the "Alpha Ready" upgrade program through the end of 1992. Under this program, Digital guarantees that Alpha upgrades (both box swaps and processor replacements) will not exceed a certain price. Digital is also promising users another VAX upgrade in 1993.

Meanwhile, also in July, Digital replaced almost its entire line of VAX systems, regaining price/performance leadership in a market it once controlled. The Alpha-ready and board-upgradable systems offer 5-40% price/performance improvements over existing products.

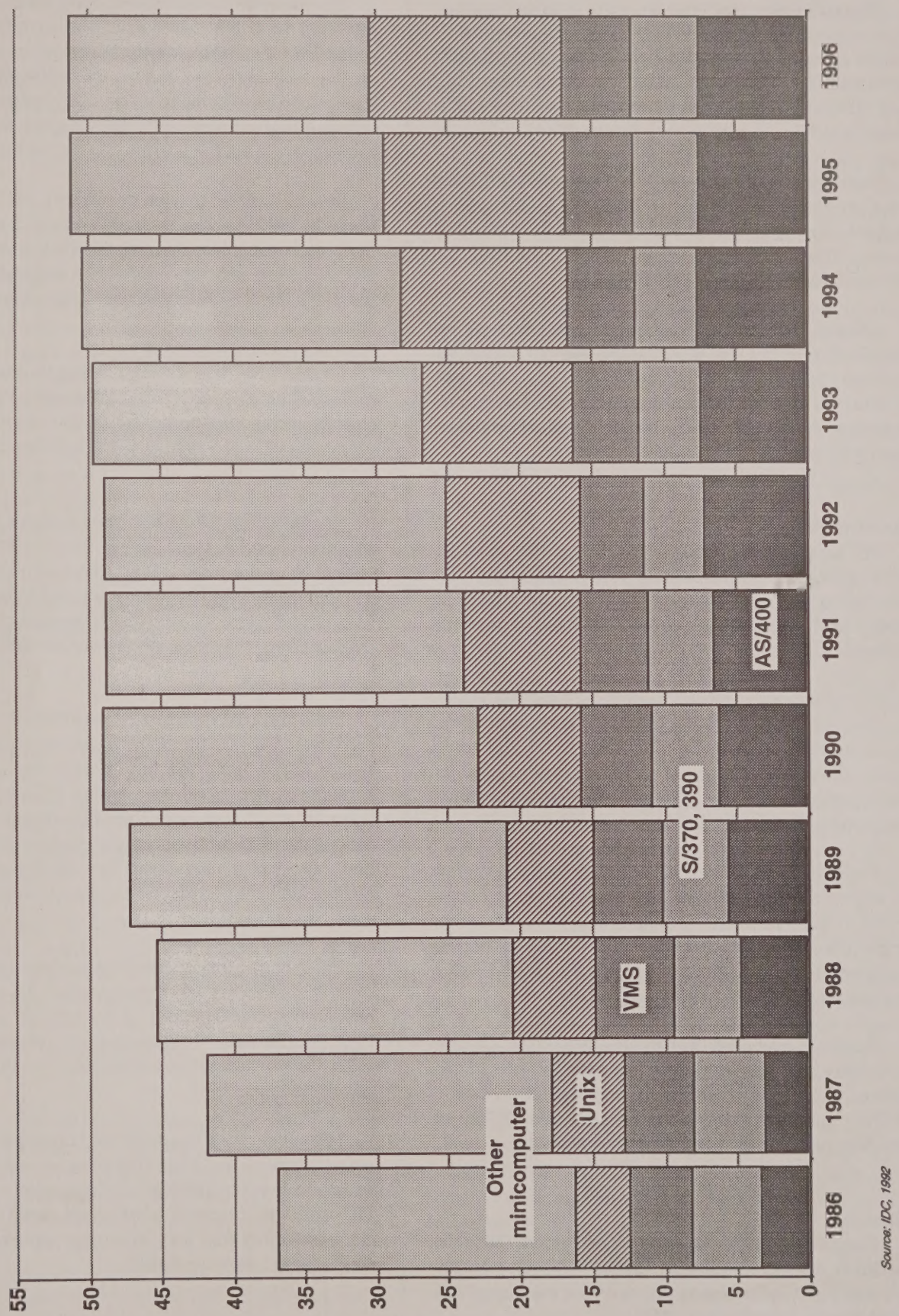
Digital has also restructured its VMS strategy. Because VMS is now POSIX compliant, Digital changed the name to OpenVMS. OpenVMS is not a new operating system. The upgrade will be offered free to all existing customers with support contracts. The main benefit to Digital is the ability to include Alpha/VMS and VAX/VMS products in U.S. and European government bids.

(continued p. 6)

1992 Worldwide Midrange

Year	Number of Systems Shipped	Unit Shipment Growth	Cumulative Number in Use	Installed Base Growth	$ Million Value Shipped	Growth in Shipment Value
			United States			
1986	220,520	NA	1,466,500	NA	$15,820	NA
1987	196,210	-11.0%	1,511,810	3.1%	$16,280	2.9%
1988	205,590	4.8%	1,601,060	5.9%	$15,930	-2.1%
1989	153,280	-25.4%	1,593,580	-0.5%	$15,530	-2.5%
1990	157,070	2.5%	1,565,720	-1.7%	$15,320	-1.4%
1991	142,451	-9.3%	1,493,022	-4.6%	$15,405	0.6%
1992	149,820	5.2%	1,423,512	-4.7%	$15,150	-1.7%
1993	155,605	3.9%	1,363,385	-4.2%	$15,085	-0.4%
1994	161,110	3.5%	1,320,120	-3.2%	$14,790	-2.0%
1995	162,420	0.8%	1,322,264	0.2%	$14,815	0.2%
1996	164,100	1.0%	1,311,182	-0.8%	$14,620	-1.3%
	91-96 CAGR	2.9%		-2.6%		-1.0%
			International			
1986	366,150	NA	1,827,670	NA	$21,020	NA
1987	414,400	13.2%	2,084,480	14.1%	$25,490	21.3%
1988	485,750	17.2%	2,419,860	16.1%	$29,260	14.8%
1989	476,300	-1.9%	2,714,150	12.2%	$31,480	7.6%
1990	500,240	5.0%	3,005,700	10.7%	$33,565	6.6%
1991	457,687	-8.5%	3,134,395	4.3%	$33,300	-0.8%
1992	457,455	-0.1%	3,234,077	3.2%	$33,640	1.0%
1993	458,145	0.2%	3,305,586	2.2%	$34,515	2.6%
1994	471,580	2.9%	3,361,600	1.7%	$35,475	2.8%
1995	475,835	0.9%	3,397,864	1.1%	$36,135	1.9%
1996	482,170	1.3%	3,424,459	0.8%	$36,445	0.9%
	91-96 CAGR	1.0%		1.8%		1.8%
			Worldwide			
1986	586,670	NA	3,294,170	NA	$36,840	NA
1987	610,610	4.1%	3,596,290	9.2%	$41,770	13.4%
1988	691,340	13.2%	4,020,920	11.8%	$45,190	8.2%
1989	629,580	-8.9%	4,307,730	7.1%	$47,010	4.0%
1990	657,310	4.4%	4,571,420	6.1%	$48,885	4.0%
1991	600,138	-8.7%	4,627,417	1.2%	$48,705	-0.4%
1992	607,275	1.2%	4,657,590	0.7%	$48,790	0.2%
1993	613,750	1.1%	4,668,971	0.2%	$49,600	1.7%
1994	632,690	3.1%	4,681,720	0.3%	$50,265	1.3%
1995	638,255	0.9%	4,720,128	0.8%	$50,950	1.4%
1996	646,270	1.3%	4,735,641	0.3%	$51,065	0.2%
	91-96 CAGR	1.5%		0.5%		1.0%

Source: IDC, 1992


Worldwide Midrange Systems Revenue by Operating Environment, 1986-1996
55
50
45
40
35
30
25
20
15
10
5
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
Other minicomputer
Unix
VMS
S/370, 390
AS/400
Source: IDC, 1992

Digital's new products are market price/performance leaders. The new VAX systems enjoy a considerable advantage over similarly configured AS/400 systems. They beat Unix/RISC products from IBM and HP and hold a slight advantage over Sun. NCR's Intel-based line remains very competitive.

Nonetheless, this lead will not last long. HP with new processor technology in late 1992 will leapfrog Digital. Sun will utilize Solaris 2.0's SMP to jump ahead. IBM will boost performance of both the AS/400 and the RS/6000 by late 1992.

Overall, Digital has stabilized the erosion of its installed base, but the new systems are not attractive enough to win new customers. Digital's hope is that Alpha will give customers that incentive. But Alpha systems will not be ready for production environments for another 18 months.

Hewlett-Packard

HP's challenge is equally as difficult as those of IBM and Digital. It has managed to successfully balance its technology and solutions businesses, but not easily. Margin pressure is making the challenge more difficult.

The company's PA RISC chip has gained widespread acceptance among other systems suppliers, most recently Stratus. On the other hand, the company offers a wide range of services, and its relations with customers are consistently excellent. The challenge is to manage both businesses.

Over the last two years, HP has grown as quickly as any midrange supplier. HP's midrange revenues grew in 1991 in both the small- and medium-scale segments of the market. It was one of the few midrange companies to grow. Business outside the United States was stronger in both market segments.

Recently, business in both lines has flattened. The company has seen an overall move to lower-margin products. HP's 3000 MPEix systems are flat, while the 9000 is growing slowly. The limited availability of floating point chips from TI stifled growth.

Stratus

Despite a decrease in sales of the System/88 (sold by IBM), overall revenue at Stratus has been steadily increasing. The company share of the midrange has held steady from 1990 to 1991.

Stratus's chief competitive capabilities — relatively low-cost fault tolerance in the midrange — face a number of problems. Tandem has renewed its focus on the midrange (as Cyclone sales disappoint). General-purpose systems from a variety of suppliers are offering high-enough availability rates to allow customers to rethink the 10-15% fault tolerance premium.

In addition, Stratus faces difficult product transitions. In 1989 the company announced a switch from the Motorola 68000 processor family to that of the Intel i860. In June it announced that future products would use HP's PA RISC architecture after all, not the Intel chip.

Stratus runs the risk of irritating its customer base and confusing prospective customers with its second change in chip allegiance. Motorola customers, which represent 90% of Stratus's installed base may be particularly hard hit.

Stratus's first PA-based fault-tolerant system — a single low-end system for application development — will be announced toward the end of next year. A full range of systems will not be available until 1994. The second round of Intel-based systems (announced this summer) will be expected to last until then.

Data General

Despite three quarters of profitability within the past year, DG still faces a difficult road to long-term health. Sales of its MV line of systems has declined faster than expected. As a result, DG optimistically pronounced that sales of Unix-based systems grew to more than 50% of overall sales faster than even DG had expected. That's great. But when the 50% mark has been reached because of a precipitous drop in MV sales, it's not great.

DG is beginning to show signs of operating within a more realistic market perspective. Its most recent announcements amount to an assault on the Unix high end. Its new database servers offer a very good price/performance and some unique systems-level capabilities.

However, if DG expects to gain more than just a small share of the Unix database server business, it must move more quickly to adopt new technology in its products. Successful vendors need to provide differentiators that are no longer achievable by following the Unix standards.

In addition, DG's RAID initiatives represent real long-term opportunity. The company's long-term strategy may center around its ability to redefine itself as a systems and services supplier to certain specific industries. Its vice-like grip on the health-care business is a significant asset that the company can leverage to stabilize itself. DG is also a strong supplier to the manufacturing and petrochemical sectors.

Sequent

Sequent is in a uniquely desirable and yet still vulnerable position. One of the first companies to base a product strategy on multiprocessing Intel boxes, Sequent has gradually seen its differentiators dissolve. SMP Intel-based systems are currently available from more than a dozen companies.

As a result, while the company had gotten away from competing on price and customizing systems (which in turn punishes margins), it is now returning to them. Finding new differentiators will not be easy.

The company's strategy for reckoning with the new competitors has been to focus on relationships with Unix database providers (including Redbrick) and Novell.

Tandem

With increasing pressure on fault-tolerant system suppliers, Tandem's medium-scale revenues dropped slightly in 1991 from 1990, but not as quickly as the total medium-scale market declined. Sales outside the United States grew slightly, while domestic sales dropped by 5.1%.

Tandem is benefiting from the recent introduction of two new systems: the CLX/R and Cyclone/R. Both are RISC-based systems. Tandem generates most of its new business from the CLX. Despite the need for customers to embark upon a rigorous migration to Tandem's RISC systems, the new ones appear to be successful.

To help with easing application migration and generation, Tandem announced an agreement this year to resell TI's IDF CASE. Previously, Tandem did not possess enough of the application development tools expertise to simplify customers' migrations.

Increasingly, Tandem's growth lies outside the United States, in markets. Underdeveloped and developing countries that are just beginning to install the telecommunications and financial infrastructure in which Tandem systems compete so well make up Tandem's most important future markets.

Wang

The changes facing Wang only seem more profound than those of its competitors. They aren't. The precariousness of the company's position has been exacerbated, however, because Wang was exceptionally slow to recognize the need to change.

Today, Wang is a $2 billion company undergoing a radical downsizing. It is slowly reducing a reliance on its VS systems and maintenance business and shifting to a software and services business.

Wang's future is as a huge reseller of IBM systems. As such, it will likely see some level of profitability in 1993. Revenues will not stabilize until 1995, at something under $1 billion.

Sun Microsystems

The archetypical midrange technology company faces two significant technology problems. It still can't ship real SMP yet, and it is waiting for superscalar chips (expected within months). Until it addresses both, Sun remains vulnerable at the high end of its product line.

In the meanwhile, it continues to outperform the market. It has lined up one major OEM (Fujitsu), yet none of the companies that have signed up to make SPARC-based systems has made any money doing it.

AT&T/NCR

With the bulk of the merger organizational details behind it, AT&T/NCR appears to have had a fair year in the midrange. Sales of the I series and V series proprietary systems are decreasing although sales of the Intel-based Unix 3000 seem to be picking up.

Indeed, the company's midrange is solid. It features multiprocessing 486s (already shipping) and has announced multiprocessing P5s. Sales of the 3600, systems with newly-acquired Teradata at the back end, may be picking up.

A Long Road for Digital's New Chief

Robert Palmer's first public performance as CEO of Digital Equipment Corporation was a striking reminder of just how different this business is from when his former boss founded the company in 1957.

Perhaps most intriguing about the official handoff was the degree to which the men's personal styles reflect their management practices. Olsen often appeared in a comfortable, rumpled suit. Palmer, sporting a diamond ring that sparkled under the spotlights, was neatly attired in a well-fitting, European cut. Olsen often meditated about whatever was on his mind. Palmer did not deviate from a carefully prepared nine-page text.

The differences underscore the changed needs of the new age in the computer industry. Considering the fortunes of his contemporaries (deCastro, Poduska, and Wang), Olsen's retirement looks pretty good. Visionaries used to run these companies. Now professional managers do. The torch had been passed; Olsen was the last holdout.

However, even a fresh management style may not help. In general, second-generation CEOs have been unable to substantially change the culture or fortunes of the company they have inherited. In most if not all cases, second-generation CEOs have largely been unable to build a new and stable foundation for the company whose character and business model was established before their arrival.

Right now few companies in the industry need strong management more than Digital. As the closest thing to a pure-play minicomputer company, Digital faces a series of inevitably painful decisions. The changing of the guard presented a unique opportunity to outline a long-term strategic path for the company.

That's why an air of anticipation surrounded Palmer's presentation at Digital last week. It's been almost a year since John Akers began hinting about changes at IBM. After 35 years of Olsen matrix management, Digital is ripe for a reorg. Nonetheless, analysts were warned in advance not to expect anything specific, and they didn't get it.

What did they get? A very polished presentation. Some said slick. Palmer's response to mostly softball questions were clear, concise restatements of portions of the canned speech. He demonstrated an impressive ability to communicate an understanding of the events surrounding the company's disastrous slip into massive, prolonged unprofitability.

Palmer outlined his vision with platitudes like "listen to the customer," "no excuses management," and "Digital can't be all things to all people." All on the mark... all rather bland. With almost three months to prepare, Palmer's presentation was devoid of specifics. In the coming weeks we'll keep our eyes on several indicators of Palmer's success:

- How quickly he backs up the good ideas with good organizational moves. Talking about the problem is simple compared to doing something about it. Sooner is better.

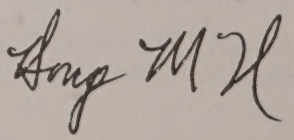
- How smoothly the Alpha rollout goes. Alpha systems must ship the same quarter they're announced; they must be aggressively positioned for Digital's installed base. Without its VAX customers, Digital is just another failing mini company.

- How he unleashes Digital's important software and services units. Both groups lie outside Palmer's area of expertise. If the new CEO gives Messrs. Gullotti and Stone the room they need to develop two key DEC businesses, it will be good news for Digital.

- How employees respond. So far, they're rallying around their new leader with enthusiasm — with, in fact, a zeal similar to the zeal with which they remember Ken Olsen.

Mr. Palmer might have reduced some of the incipient pain by sharing more specific ideas his first day on the job. That he did not is only a very mild surprise. Most important, he said nothing that would indicate he was not up to this very difficult job.

In light of the legacy of second-generation CEOs, Mr. Palmer's challenges are daunting. However, Digital has a greater reserve of state-of-the-art technology, loyal customers and highly-skilled labor than other minicomputer companies in a similar position. This kind of almost unprecedented turnaround takes time. As a marathon runner, Mr. Palmer has, apparently, great endurance. He will need it.



Services Review and Forecast

THE GRAY SHEET

Computer Industry REPORT

DOUG McLEOD, EDITOR | OCTOBER 16,1992 | VOL. 27, NO. 23 | Published continuously since 1964.

How Fast and How Much Longer Can IT Services Grow?

Nothing in IT is outgrowing the catch all "professional services" and "systems integration" market segments in almost every region of the world. But over the past several months few new, big outsourcing contracts have been signed. Is the decline a signal that overall service growth will slow, or is it just a small dip in a generally upward trend?

To answer such questions, International Data Corporation (IDC), publisher of the *Gray Sheet*, employs two methods: analyses of those who *provide* and those who *purchase* IT services.

Users continue to point to higher and higher spending for services. Almost 14% of U.S. sites are currently using a systems integrator, compared to 11% in 1991. Almost 25% of U.S. IT sites indicate they are using or considering using a systems integrator in 1992.

On the other side of the coin, suppliers of IT services — from accounting firms to hardware and software companies — are, almost universally, launching new service products and expanding their services infrastructure. Their interest in services has never been higher.

In short, most signs are still pointing up, but the services boom will not last forever. Consider the following:

- Demand for IT services is cyclical. Services compete with hardware and software for users' resources. When the tools (the hardware and software) do not work, users buy services. The eighties, a period of fairly usable products (spreadsheets and word processing), experienced relatively low services spending. The nineties are experiencing a much higher level of interest in services because of the difficulty of installing LANs, making them work, and writing distributed applications. Eventually, even these tasks will be simplified by hardware and software suppliers, and services revenue may level off.
- Services are currently a local business compared to hardware and software products. It has negative economies of scale: a bigger project means more expenses per unit, not fewer; services providers watch their cost structures (and billable rates) climb as they expand their infrastructure to provide services worldwide. As a result, large IT services providers will be undercut by local providers, and their growth may suffer. One trend, however, that may change the local nature of services is remote support, one of the fastest growing segments of the services business.

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IDC International Data Corporation
5 Speen Street, Framingham, MA 01701
(508) 872-8200

- Surplus labor triggers lower unit labor costs. Eventually a worldwide glut of software engineers may result in lower costs for their services. Countries in Eastern Europe, India, and China have targeted software and will supply much of the lower-cost software expertise. The key questions: how elastic is demand for application development, customization, and software maintenance, and what is the point of diminishing returns for software staffing on big projects in light of paradigm-shifting technologies like OOP? Both will determine whether lower costs for programmers will materially affect overall services spending.
- Spending for services taps internal MIS funds as opposed to funds spent outside of the organization on systems and software. But as users cut closer and closer to the bone, suppliers get less and less meat.
- The services market is becoming overcrowded. Inevitable competition between traditional service companies and hardware companies seeking to offset declining hardware sales will result in a surplus of service providers.

Spending for IT services will continue to grow in the near term but likely will not keep up its fantastic rate over the long term. Professional services and systems integration services — the two broadest services categories in IDC's industry taxonomy — accounted for 35% of worldwide IT industry spending in 1991. They are growing faster than the overall industry by as much as 15%.

Some of the short-term optimism comes from the fact that services exhibit classic signs of immature, growing markets. They are very fragmented. The top 10 suppliers account for only a tiny portion of the overall market. Distinguishing differentiation between suppliers' products is difficult, if not impossible. Everyone sells "professional services," but what are they and whose are any good?

As the market matures, services businesses will need to continually modify their business model. Many of them are continually adjusting their strategies in three areas: collaboration, organizational structure, and internationalization.

Collaboration

Services providers build solutions from the widest possible array of technologies, from a wide array of technology suppliers. It seems that almost every system integrator has "strategic" relations with almost every hardware and software supplier.

Few of the relationships are really productive. Even fewer seem to last for more than one or two deals. The reasons: every large systems integration and professional services contract is highly individualized and customized. Partners within the major accounting and private professional services firms have different biases.

Nonetheless, no company can do it all. Services companies need to draw from a broad base of technology. And, the ability to buy technology from a variety of suppliers is a key attraction of services companies to their customers.

As a result, building successful alliances and collaborations will continue to play an important role in services suppliers' long range plans. Few if any integrators will be able to afford to develop expertise on all hardware and software paltforms from all suppliers.

That does not, however, mean that any kind of equity — or even publicly-acknowledegd — relationships will develop between services companies and hardware or software suppliers. More likely, today's any-to-any (sometimes it seems like all-to-all) relationships will be replaced by more solid relations between fewer companies.

Organization

Many IT services providers are organizing around vertical markets. If sales organizations are not overtly constructed around vertical industry groups, they are covertly and surreptitiously segmented into industry areas.

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But firms in other professional services businesses—lawyers, accountants, for example—rarely organize by vertical markets. They are more likely to organize around horizontal departments — strategy or human resources consulting (for management consultants), patents or libel (for legal firms).

Does a horizontal orientation prevent businesses in those industries from giving their customers individual attention? Probably not.

What, then, is the optimal organization structure for IT services firms moving from traditional maintenance types of businesses to broader professional services? Companies need to balance vertical and horizontal orientations in a tricky matrix format.

IT services suppliers need a vertical orientation to understand clients' distinct needs. But they need a horizontal organization to deliver a range of services efficiently. EDS' recent reorganization (see page 7) acknowledges this fact. In the future, IT services suppliers may organize around horizontal abilities and expertise: transaction processing, image solutions, office automation solutions.

In the near term, as services companies grow, they will continually adjust their business models. The proper balance between customer orientation and technology will determine how well suppliers can understand customers' problems, and how inexpensively they can solve them.

Worldwide Professional Services Revenues, 1991

Vendor	U.S.	International
System/Commun. HW Vendor	$5,198	$3,032
Big 6 Accounting Firms	$2,468	$2,637
Large PS Companies	$9,032	$1,472
Small PS/Consultancies	$1,498	$122
Network Int./Others	$1,475	$93
Non-U.S. Vendors	$1,676	$41,975

Source: IDC, 1992

Internationalization

Services are harder to export than products. The proportion of non-U.S. business for hardware and software companies is much higher than that for services companies.

But the pressures to globalize are increasing. Customers are demanding global solutions. To attain volume in vertical niches, suppliers must attract customers from all over the world. Efficiently expanding international business will be a major challenge for growing services suppliers.

Profiles of Selected Suppliers of IT Services

IT services suppliers, and the services segments of larger IT businesses, are among the most healthy IT companies. Some are doing better than others. Andersen, Cap Gemini Sogeti, EDS, IBM, and a host of smaller companies are performing very well. Others are bogged down by corporate bureaucracy, changing technology, and industry upheaval. An update on some key services companies follows:

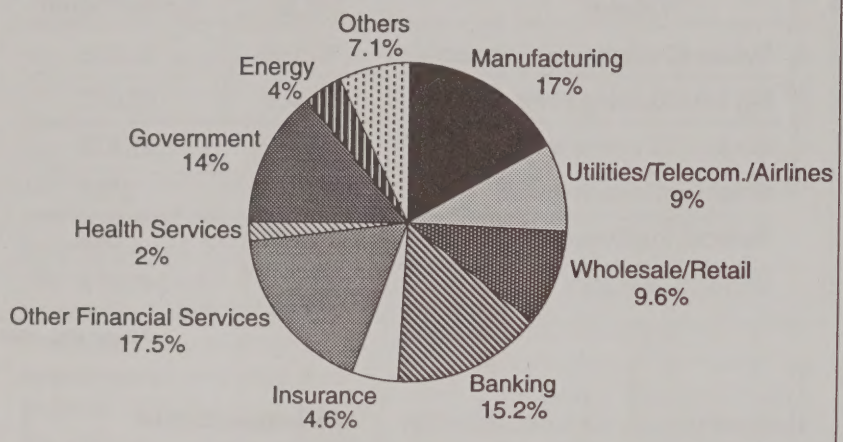
Andersen Consulting

Andersen Consulting was spun off into a distinct organization from the Arthur Andersen accounting firm in 1990. It is a wholly owned subsidiary of a Swiss holding firm, Andersen SA.

Revenue for the year ending in September will total approximately $2.7 billion. Andersen's European business is growing faster than its overall business and will total approximately 45% of worldwide rev-enue.

Andersen Consulting has 700 partners who manage 145 offices in 46 countries. The company is organized into several lines of business, including the three major geographic areas, three service lines (integration services, strategic services, and change

Andersen Consulting's Vertical Markets in Europe



Total 1991 European revenue: $500 million

Source: IDC, 1992

management), and three product areas (application, technology services, and market development).

Market development is responsible for management of Ander-sen's six industry practices: consumer package goods, telecommunications, government, utilities, financial services, and health care.

Beneath the vertically oriented industry practices are a range of horizontal support structures: technology services (AI, image, telecommunications, and object), internal training (a suite of 250 courses aimed at providing a common background for all Andersen consultants), advanced training centers, and AAnet worldwide voice and data network.

Andersen's average systems integration project falls into the $5 million to $25 million range; some exceed $100 million. Within the three basic areas, integration services, strategic services, and change management, Andersen offers a wide range of services. Among professional services, Andersen is particularly strong in consulting, contract programming, and subsystem implementation services.

Andersen faces at least two great challenges. With more companies now offering the high-margin services upon which Andersen thrives, competition will only get tougher. Andersen will need to address smaller users in more price-sensitive markets.

In addition, coordinating the loose network of partners can lead to problems. That dissident partners in Spain have attempted a buyout may indicate the gravity of the problem. If Andersen builds an inclusive, team-oriented, hungry culture, it will be better suited to win in the more competitive times ahead.

Cap Gemini Sogeti

Cap Gemini Sogeti (CGS) is Europe's largest and most successful services company. As U.S.-based companies expand their European operations, CGS is finding that competition is getting tougher on its home turf while it feels pressure to globalize.

In addition to growing its business internally, CGS is relying on a partnership with Daimler-Benz (which purchased 34% of CGS in July 1991) and acquisitions. In 1990, it bought U.K.-based Hoskyns, Swedish-based Progmac, and the Dutch company Volmac. CGS operations in those countries are now headed by the acquired firms. In February, CGS announced plans to purchase Programator, a Swedish services company.

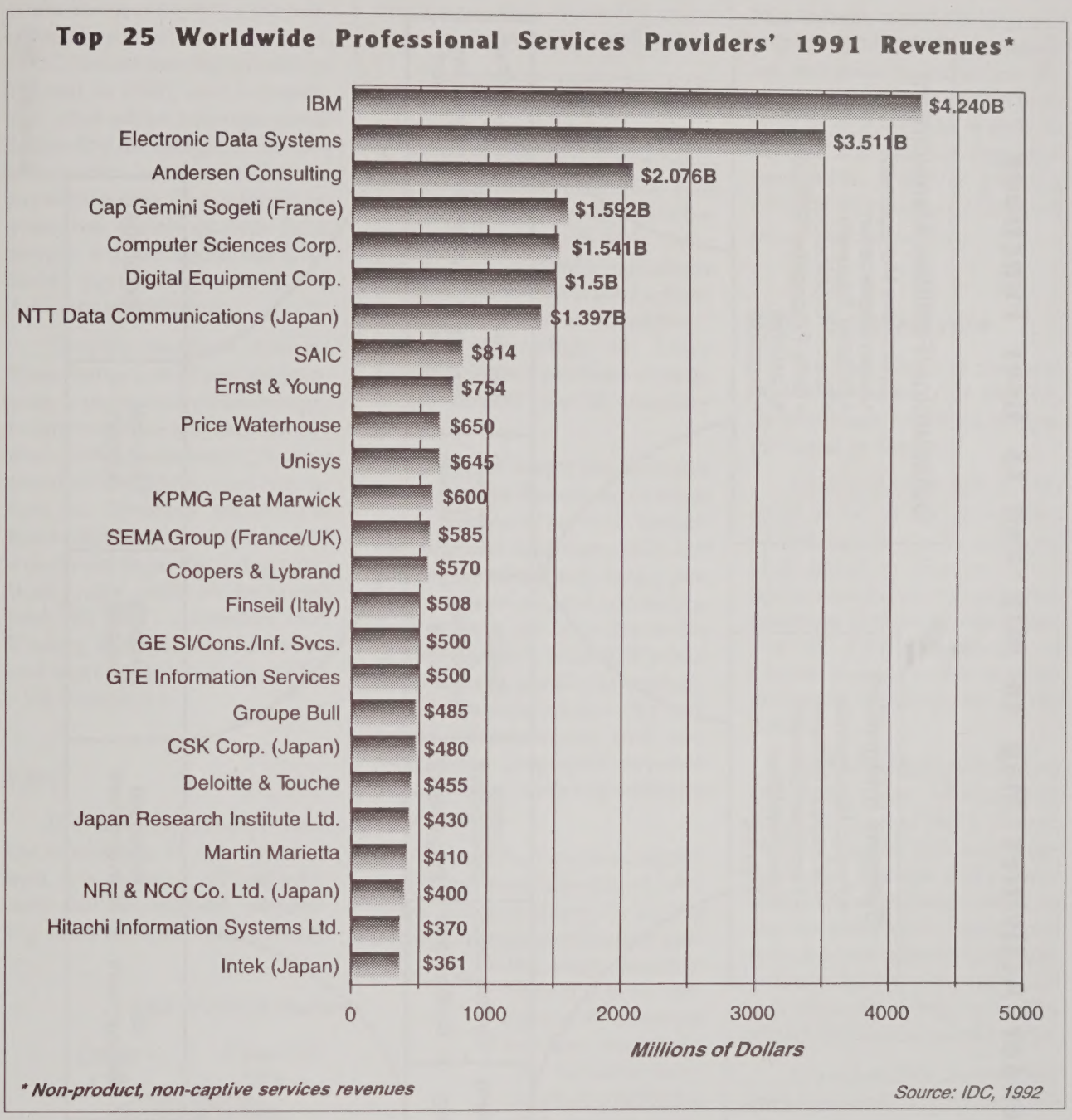
CGS is organized in four geographic divisions and two functional groups. The four geographic groups are: Cap Sesa (France); Hoskyns (UK); Cap Gemini Europe (remainder of Europe); and Cap Gemini America. Cap Gemini International Support provides marketing and R&D support. Sogeti SA, the company that owns 58% of CGS, also owns a management consultancy services group.

The company's vertical market strengths differ by country. In Germany, CGS is focused on manufacturing and defense. In Italy, it focuses on government contracts, while in France, CGS concentrates on manufacturing (over 20% of its business), telecommunications, defense, banking, and utilities.

The majority of CGS's revenue comes from France, followed by the United Kingdom, other European countries and the United States.

IBM

IBM has also recently reorganized its consulting and services businesses which, it says,



are outgrowing the industry by a factor of 3.

The company has broken its services offerings into four components: management consulting (where IBM works with the customer to determine "what to do"), functional consulting (how to do it), implementation services (help build it), and operational services (help run it). A brief rundown of each group follows:

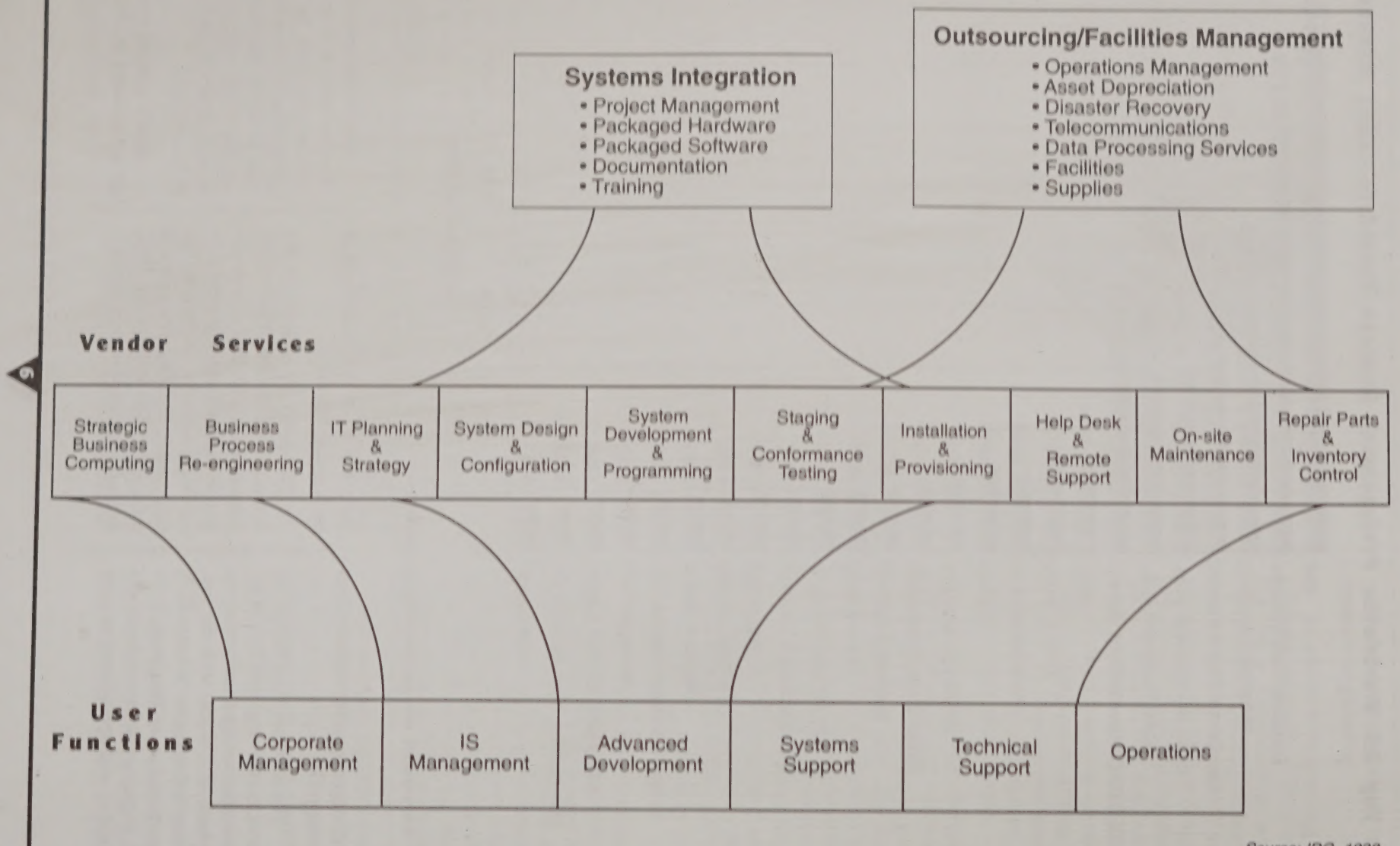
IBM officially announced the formation of the IBM Consulting Group on Oct. 19. IBM counts approximately 150 management consulting contracts. Including the functional consulting, revenue will total about $80 million for 1992, excluding all hardware revenue.

IBM's implementation services revenue will grow by approximately 35% in 1992. The group employs over 350 consultants in the United States, and by yearend 1992 will have 70 domestic contracts and 15-20 non-U.S. contracts.

IBM's operational services group consists of IBM's profes-

(Continued, p. 7)

How Service Vendor Activities Map to MIS and IS User Functions



Source: IDC, 1992

sional services business, the Integrated Systems Solutions Corp., (ISSC, the outsourcing subsidiary formed in 1991), and Advantis, the value-added network group formed by the merger of the IBM information network and Sears network group. Operational services has a staff of over 8,000 people, with an additional 2,000 field personnel and 3,000 Advantis employees.

Despite (perhaps due to) these changes, no IT services company is more susceptible to organizational bloat and inefficiency than IBM. Coordinating its vast resources is IBM's most important job. Someone somewhere inside IBM has probably achieved a degree of expertise fixing practically any difficult technical problem IBM's customers face. Finding that person, however, and tapping that resource will be a formidable job.

EDS

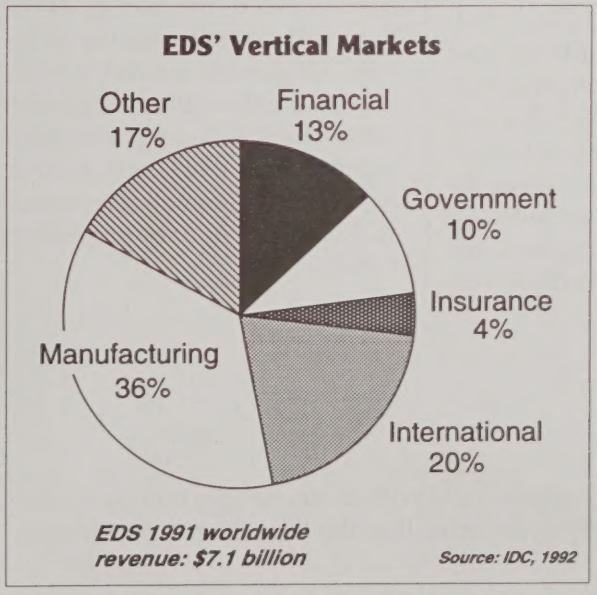
EDS continues to outperform the worldwide IT services markets. It is weaning off GM business and successfully proceeding with an ambitious international expansion, spurred by major acquisitions in Europe and Japan.

The company continues to refine its strategy in the United States. While the basic unit of organizational measurement at EDS remains industry group, geographical and horizontal axes are emerging in the corporate structure. In early October, EDS announced a significant reorganization that added a horizontal "technical infrastructure" group (reporting to Gary Fernandez) that provides a range of services to the 23 industry groups.

Grouped under the technical infrastructure banner are a number of "centers of service," including electronic commerce (EDI and banking applications), image, professional services, and consulting. Each of these groups will provide industry groups with EDS's best talent in very specific technology. In addition to the creation of a horizontal infrastructure, EDS also rolled out a geographic structure that formalizes reporting within the three regions.

These moves are more significant than a simple paring of overhead. EDS recognizes the need to develop economies of scale in leading-edge applications if it is to compete with boutique services suppliers. The technical infrastructure platform is EDS' answer.

Still, the company must go further to eliminate the perception of technology bias. Many potential customers still view EDS as a mainframe shop, even though the huge majority of the MIPS it installs are MIPS on PCs. Indeed, until EDS can compete head to head with the smallest and most cost-effective PC integrators, it may continue to have a problem. As it sells to smaller and smaller organizations, EDS — and its growing cost structure — may price itself out of the competition.



SHL Systemhouse

The past year has been one big roller coaster ride for SHL Systemhouse, a systems integrator based in Toronto.

During the last half of 1991 and first half of 1992, it was successful largely on the strengths of its ability to manage client/server-based systems integration contracts. Coupled with its successful ComputerLand of Canada business, SHL was regarded as an integrator of the future.

But then a highly publicized and sought-after alliance with Bell Canada and Bell's parent, BCE, Inc., failed. SHL was to operate and manage Bell's giant computer and billing centers, as well as license jointly-developed software and systems to its telecommunications companies. Bell also chose not to buy up to 60% of SHL (it already owned 26%).

As a result, SHL is once again one of the smallest players in the worldwide outsourcing business. The "leaner and meaner than EDS and Andersen" strategy may not play with customers wary of entrusting their strategic IS plans to an organization with only 3,000 employees. On the other hand, SHL's cost profile is smaller than those of many of its competitors, and it is well positioned to address the low end of the market — a segment with great potential.

Downsized Services: Problems for the Big Integrators?

Information technology services — anything that doesn't come in a box or on a forklift — are an amorphous lot. Neither suppliers nor customers have a real solid understanding of where the various segments of IT services — systems and applications planning, design, development, testing, installation, training, and maintenance — pick up or end.

That causes more than a little apprehension at companies interested in growing revenues and profitability. Services are, after all, among the fastest growing and most profitable segments of this generally moribund industry.

What's worse, and perhaps more important, is the tectonic shift away from mainframe-based services to LAN-based services that is changing the rules of the services game.

The companies that are providing LAN-based IT services — hundreds of small bands of software consultants and cable pullers — represent a real threat to the established services companies. The newcomers' cost structures are much lower. They are leaner and can respond more quickly than larger companies. More than one established services company is starting to squirm as a result.

But the newcomers also face challenges. Installing systems, developing new applications or integrating existing IT products in a mainframe world is a highly complex endeavor. Organizations hire services companies to do it for them because it is so risky and can be so expensive. But in some ways, it is simpler than delivering solutions to end users in a distributed environment. At least, providing mainframe-based services often do not pose many of the systemic changes that are part and parcel of downsized solutions.

Companies rarely downsize from mainframes to smaller hardware platforms totally absent of pain. Applications must be rewritten, recoded, or at least reassembled. PC and LAN platforms running key applications may require constant supervision. Staffing may need retraining or slimming. Security, availability and backup issues must be addressed.

In a similar way, providing downsizing services, or services in a downsized environment, cannot ever be totally devoid of pain either. For all the same reasons that companies have trouble down-sizing, companies that sell down-sized or -sizing services face difficult challenges, too. These include services like implementing enterprisewide networking, integrating data and applications across platforms or geographies, assuring uniformity of tools and solutions, and offering new integrated management solutions or services to effectively run it. Services suppliers in these segments face complex organizational challenges in addition to the daunting technical ones.

Does that mean the EDSs, ISSCs, and Andersens of the world are in trouble? Probably not. Even if EDS's sales pipeline stopped flowing tomorrow, EDS would have billions of dollars worth of outsourcing commitments for another ten years. And, mainframe-solutions expertise has a certain timelessness. The installed base of medium and large systems will ensure some level of demand far into the next millenium.

However, several trends are working against the older services providers. Services contracts at big companies are getting smaller. The largest segment of the market, small- and medium-sized companies, never signed huge services contracts to begin with. The larger companies' new competitors are smaller, faster and

Inevitably, large services companies will need to focus on the low end of the market. How they will do that remains to be seen. Of greater interest is how they will either compete *against* or *with* the small companies selling into those markets now, and how effectively small companies will compete in enterprisewide bids.

P.S. Regular readers of the Gray Sheet will have noticed our new look. With these changes we can deliver more information in a cleaner, easier-to-use format. We hope you agree that the Gray Sheet continues to improve; as always, your comments are appreciated.

THE GRAY SHEET
Computer Industry
REPORT

DOUG McLEOD, EDITOR NOVEMBER 6 ,1992 VOL. 27, NO. 24 Published continuously since 1964.

Novell's Leap to Enterprise Networking: How Risky? How Necessary?

Novell NetWare's 59% of the worldwide PC LAN OS market is one of the three near- monopolies in the PC industry (with Intel and Microsoft). That's good and bad. As IBM knows too well, leadership attracts competition. Almost inevitably, a monopoly-like market share will decline.

Novell is coming to grips with the new competition. In the words of founder Ray Noorda, NetWare has progressed from "somewhere" (running on isolated PCs) to "anywhere" (networks scattered about an organization) to "everywhere" (the well-publicized anything-to-anything, anyone-to-anyone strategy) to "underwear." NetWare's future is to play the underlying broker that coordinates transfer of data and services between distributed clients, applications, servers, and databases. It is moving from PC LAN software to enterprisewide networking software.

Will the new strategy play? In light of the increasingly important role network computing is adopting, and in light of new competition from alternate suppliers like IBM, Digital, Microsoft, Sun, and others, it faces some difficult challenges. Competition from newer and more robust products may render NetWare obsolete. At least four issues dog Novell:

- Can NetWare Loadable Modules (NLMs) provide enough function to tap new network-based applications — the ISV community's next focal point? Novell has extended the functionality of NetWare by incorporating NLMs (hundreds of NLMs are publicly available from dozens of suppliers) into the core network OS. NLMs give Novell users quick and (usually) inexpensive access to almost every type of system, service and environment imaginable. But not without some risks. Running multiple NLMs concurrently over a medium- to large-sized NetWare network can exercise a network manager's patience. And, as new applications are written to take advantage of networked processors and specialized services on specific servers, will NLMs be robust and fast enough to support them?
- Can Novell manage complex systems and systems/network management? Reliability concerns may render NetWare inappropriate for some strategic applications. If PC networks are to siphon increasingly important applications from larger systems, Novell needs to

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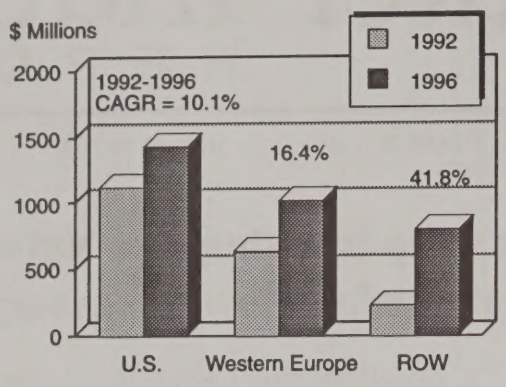
IDC International Data Corporation
5 Speen Street, Framingham, MA 01701
(508) 872-8200

imbue NetWare with a more robust structure and image. Many organizations will demand fault-tolerant (or at least high-availability) LANs. In addition, installing and maintaining NetWare networks is expensive, time consuming and difficult. Novell's network of OEMs and resellers have some of the most impressive network design, integration and support skills in the industry. And no LAN company has a wider distribution network. But some customers may remain wary of entrusting NetWare with the family jewels.

- Can Novell go head-to-head with Microsoft...and win? While DR-DOS remains no match for DOS/Windows, and Windows for Workgroups is aimed squarely only at Novell Lite (which is hardly Novell's most important strategic product), competition between Novell and Microsoft will become intense. With the Fox acquisition, and Microsoft's in-house database development efforts, the only PC software market Microsoft does not play well in is networking.
- And ultimately, can Novell build a business out of simply providing the connectivity, while letting others build the services on top of it? In the long term, client manufacturers will put today's NOS functionality directly into their OS kernel. Such a move would render NetWare technologically non-essential. To survive when that occurs, Novell may need to turn its connectivity story into its only story. It needs to be the place to turn for access to thousands of services, even though it may not provide many of them.

Forecast of PC LAN Operating Systems



Total 1992 NOS Revenue: $1,996.5 million
Total 1996 NOS Revenue: $3,249.1 million

Source: IDC, 1992

In light of the competition from suppliers with newer NOS products, Novell has two basic options. It can milk its existing technology and continue to provide customers with a smooth, well-defined, unexciting upgrade path to limited, new, NLM-based functions and services. Or it can scrap the current NetWare and NLM hodgepodge and rewrite a new, vastly more powerful and exciting, NetWare.

Can a Slow and Steady Novell Win the Race?

The first strategy is the safer of the two. NetWare continues to provide a strong solution for many customers. In addition, a huge number of organizations have made a strategic commitment to Novell (see sidebar, page 4). More importantly, while IDC's forecasts call for Novell to lose a few points of market share over the next five years, the overall NOS market is still large, and it's still growing.

In addition, NetWare customers will continue to buy upgrades and add new functionality to their existing installations. The company's recent push into hub, router software and additional network management functions present new opportunities.

So while sticking with the current core NetWare technology may not be as exciting as other NOS products, it offers Novell a safe revenue stream. The company must question the necessity of tampering with a successful strategy.

But the relatively risk-free strategy is not without drawbacks. Expanding NetWare fea-

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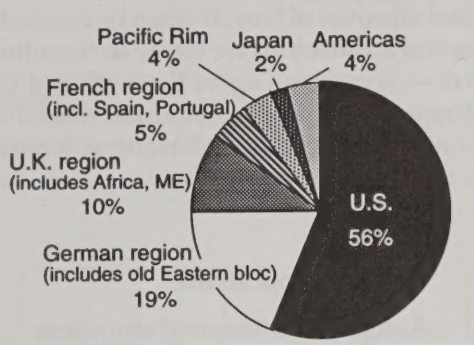
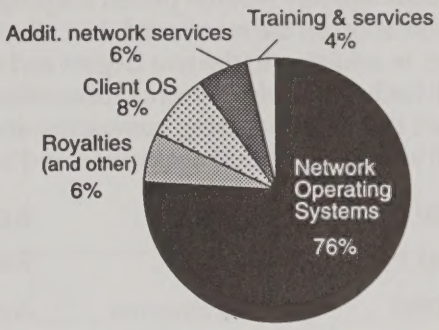
Novell 1991 Revenue by Geography



Note: Japan is growing by approximately 50% quarter-to-quarter. Non-U.S. growth 2Q91-2Q92 exceeded 85%. Novell has 30 U.S. sales offices, and 15 country subsidiaries and sales offices worldwide

Novell 1991 Revenue by Product



Note: Revenue has been restated as though DRI were included.

Source: Novell, 1992

tures through more and more complex NLMs may make an already bad situation worse. Novell customers will soon begin pushing the current NetWare to its limits. Whether NetWare is robust enough to stand up to truly enterprisewide connectivity remains to be seen.

Is NetWare Overhaul a Needlessly Risky Strategy?

By releasing a brand new, cleaner, safer, and faster version of NetWare, the second strategy, Novell will answer many of these concerns. A newer NetWare might be a far better cornerstone for building enterprisewide networks and for facilitating the design of tomorrow's distributed applications. As the competition has shown, building greater functionality into the NOS need not compromise ease of use.

However, the NetWare overhaul would open a huge door for potential competitors. Getting a new operating system to market is very difficult and time consuming. Any supplier can build backwards compatibility to existing NetWare installations and applications into their NOS. They might also make hay of the opportunity by practically giving away their NOS as Novell customers wait for the new NetWare.

Conclusion: Why Fix What Isn't Broken?

Novell faces a series of challenges the likes of which it has not seen before. Building enterprise networks requires more than a solid product and great distribution network. The company's fabulous success has redefined the company's challenges.

Novell is slowly expanding its suite of products with new management, router, and hub software that open the small-department LANs to a whole new world of possibilities. Novell will likely further broaden its enterprisewide offerings with new products along the lines of the recent enterprise announcements.

Further diversification will come from Univel, its joint venture with USL. One year ago, Novell increased its share in Univel to 40%. Much next-generation NetWare technology will come from Univel. In addition, Univel's desktop expertise may be a dark horse in the relationship — one that pushes Novell into more direct competition with Microsoft.

Novell retains a strong influence on LAN VARs. While an increasing portion of worldwide sales are coming from OEMs, VARs remain Novell's bread and butter. And they are loathe to take on other NOSs that lack NetWare's strong market image. NetWare will continue to sell well if for no other reason than Novell's cooperation with a broad range of resellers.

Finally, Novell is building enough relationships to ensure itself a place somewhere right in the middle of almost any kind of heterogeneous network that organizations will be building in the next five years. Simply put, there is no other way of connecting to so many disparate systems so easily. Regardless of NetWare's technical drawbacks, that ability will keep Novell in the forefront of customers' enterprise networking plans for years to come.

Novell's Quiet, but Aggressive, Acquisitions

Two years ago Ray Noorda pulled the plug on Lotus' proposed takeover of Novell when he insisted on equal representation on the new board. Not all of Novell's mergers and acquisitions are either so tumultuous or so sizable. In addition to the two largest and well-known moves — acquiring Digital Research and Excelan — Novell has been involved in a host of smaller acquisitions and investments. The company has shored up its own product line by purchasing companies and technologies at a surprising rate. Following is a partial list of Novell's most significant acquisition and investment moves over the past five years.

Month/Year	Company	Action	Market
August 1992	Quarterdeck	Rumor	Desktop applications
June 1992	Annatek Systems	Acquired	Automated software distribution
April 1992	Int. Bus. Software	Acquired	Distributed file system for Macintosh
March 1992	Microsource	Acquired	Manufactures microwave components
Jan. 1992	Serius Corp.	Undisclosed stake	Object-based app. builder for Macintosh
Nov. 1991	Digital Research	Merger	Desktop OS
Sept. 1991	Da Vinci Systems	Acquired 40%	E-mail
Oct. 1990	Indisy Software	Acquired	Mainframe electronic messsaging
May 1990	Gupta	Acquired 20%	SQL gateway, database server and front end
June 1989	Excelan	Acquired	LAN hardware and software
April 1987	Softcraft	Acquired	Database utility: Btrieve
March 1987	Dialogic Systems	Majority stake	File transfer system and utilities
Feb. 1987	CXI	Acquired	Micro-mainframe software
Dec. 1986	Santa Clara Systems	Acquired	Peripherals
June 1986	Cache Data	Acquired	Dealer support and inventory services

Source: IDC, 1992

NetWare Remains the Strategic NOS of Choice Among 51% of Buyers

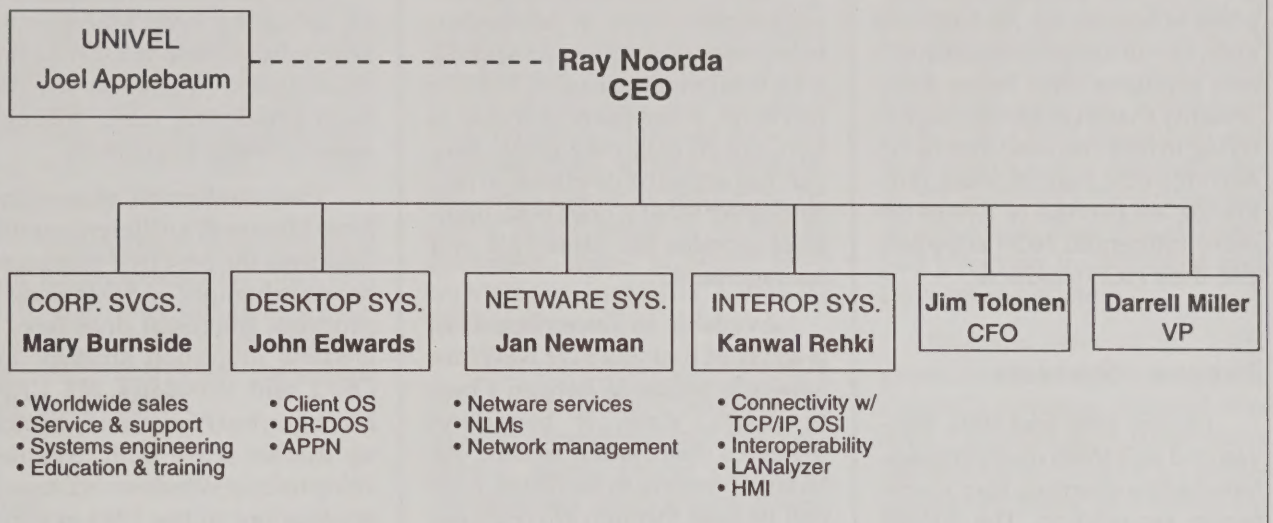
In IDC's survey of 1,600 end-user organizations, Novell's NetWare is the clear LAN NOS winner. NetWare is in use at approximately 51% of the sites surveyed, while IBM's LAN Server is in use at 14% of the sites. Microsoft's LAN Manager is present at 5% of the sites, and Banyan VINES at 3%. A surprisingly high 21% of respondents had no LAN operating systems present (reflecting the lack of LAN NOSs at AS/400 and other minicomputer sites).

When respondents were asked whether their organizations had made a strategic commitment to a NOS, the results were even more encouraging for Novell.

Approximately one half of the sites surveyed have made a strategic commitment to any LAN operating system. Of those, 65% have committed to NetWare. This indicates Novell will continue to be an important player in the evolution of client/server and distributed computing.

IBM's LAN Server is the NOS of choice at 14% of those sites, giving IBM hope it will be able to sell its vision of LAN computing at least to IBM shops. Microsoft's LAN Manager was the NOS of choice at only 3% of the sites that have made a strategic commitment to a NOS. The disappointing results are probably due to confusion concerning the future of OS/2 LAN Manager, given Microsoft's emphasis on Windows NT. Finally, Banyan's VINES is a strategic commitment at slightly over 2% of the sites. While Banyan has shown ability to sell large networks, it has only sold them to a small number of organizations.

Novell Organization Chart



Novell is split along functional lines with the lion's share of the company's product managers answering through the NetWare Systems Group (NSG) to Jan Newman. Mr. Newman moved to the NSG from Novell's sales and services organization in April 1992.

The Desktop Systems Group is comprised largely of products and people acquired from DRI last year. Former DRI head Richard Williams was replaced at the helm of the Desktop Systems Group by John Edwards in April. Edwards had held marketing responsibilities for NetWare 3.11, 2.2 , and Lite.

Univel is jointly owned by Novell and Unix Systems Laboratories. Its CEO, Joel Applebaum, reports to a board comprised of Novell and USL executives.

Source: IDC and Novell, 1992

The Changing of the Guard: Who Will Lead Novell into the 21st Century?

Ever since Novell's Lotus merger talks were called off, speculation about who Ray Noorda will choose to succeed him at the helm of the billion-dollar company has been rampant. Mr. Noorda, who at 66 is under no imperative to resign, was responsible for pulling the plug on the proposed merger. That might lend credence to the likelihood that choosing his successor is fraught with difficulties.

Choosing a successor is never easy. At Novell, where cultivating healthy external relationships has been such an important component of the company's success, it will be even harder. But in order to achieve a level of long-term confidence, it behooves Mr. Noorda and Novell to outline future management personnel plans in greater detail.

Potential internal candidates probably include some of the key managers listed in the organizational chart above. While these individuals will have a solid understanding of the internal operations of Novell, finding someone with Noorda's unique blend of talents and experience will be impossible. Noorda himself retains rather tight control over operations.

Potential candidates from outside Novell might have a broader range of strategic and financial management experience. But they will probably not possess an adequate understanding of Novell's unique position in the industry.

Profiles of Leading Network Operating Systems Suppliers

Competition among NOS suppliers is heating up. As NetWare ages, newer alternate and substitute products offer better functionality than ever before. Each is trying to find cracks and niches in Novell's 60% market share. Following are profiles of five of the more influential NOS suppliers and their NOS products:

Banyan Systems

During 1990 and 1991, Banyan and its VINES operating system made a quantum leap in corporate recognition. The VINES StreetTalk directory has enabled Banyan to sell and install sophisticated networks in many accounts. The vacuum between Novell (small and medium networks) and OS/2 LAN Manager has benefited Banyan.

Over the past 12 months, Banyan has worked to address its major weaknesses: distribution, international sales and marketing image. Like Novell, Banyan is now relying almost completely on indirect sales. It has increased the number of authorized resellers to 600 worldwide. In addition, international sales are rising faster than domestic sales.

In February, Banyan announced a new pricing schedule designed to promote sales to smaller departments. The company also restructured its distribution channels to promote low-end sales. It plans to increase the number of authorized resellers that can sell only the 5-, 10- and 20-user versions of VINES by almost 500 dealers.

Banyan's most significant announcement came in September: enterprise network services (ENS), with the first release being ENS for NetWare. After years of trying to beat Novell at its own game, Banyan has adjusted its efforts to better deliver what it does best: high-level services like StreetTalk and management.

Available in December, ENS is an NLM that will give NetWare networks access to Banyan's best products. And, it broadens Banyan's distribution system. As an enhancement to NetWare, ENS will be sold through Novell's extensive dealer network.

While a significant departure from Banyan's previous head-to-head strategy, ENS does not signify that Banyan is giving up on its core NOS strategy. The company is positioning Banyan services in what it perceives to be the appropriate packages to allow customers to buy just what they need to solve their problems.

Microsoft

Microsoft's 1990 and 1991 attempts to regain control over LAN Manager marketing and distribution are beginning to pay off. Combined, all LAN Manager-based products now capture approximately 20% of all LAN nodes shipped. This includes OEM deals (with Digital), and LAN Manager Unix deals (with HP, AT&T/NCR and Bull, among others).

Microsoft has been focusing on recruiting LAN Manager resellers. In addition to 1,400 worldwide dealers, Microsoft has also been promoting deals through major systems integrators.

The confusion stemming from Microsoft's differences with IBM over the past two years continues to hamper LAN Manager's progress. Microsoft does have a credible migration strategy for OS/2 and Windows NT LAN Manager, but it is unlikely to pick up market share until ISVs develop unique Windows NT-based applications in late 1993 or early 1994. It remains stuck with an obstensibly contradictory marketing message: it sells DOS and Windows for clients, but LAN Manager, its NOS, runs only on OS/2.

Windows NT will include some basic networking functions, similar to those of Apple's System 7. LAN Manager will be offered in both OS/2 and NT versions. Both versions will have the same transport and administration functions; users will not need to know which version is running at the server.

Artisoft

Artisoft has become successful over the past two years by providing low-cost, easy-to-use peer-to-peer networking. Artisoft's LANtastic has become the leading product at the low end of the NOS market, outselling NetWare Lite (its leading competitor). For example, Artisoft sells a starter kit of two Ethernet

adapters, a LANtastic license, coax cable and terminators for a list price of only $799.

Artisoft sells LANtastic through approximately 5,000 resellers in the United States and Europe. Over the past year, the company has focused on increasing sales outside the U.S. (currently only 28% of sales).

The company recently added Macintosh networking to its products. With a PC acting as a gateway, PC and Macintosh users can share files and printers at a starting price of $799.

IBM

IBM's mid-1991 decision to resell Novell NetWare is an acknowledgment that IBM's inability to sell LAN Server (only 6% of the worldwide market in 1991) has been limiting IBM's account control and ability to sell distributed systems.

While IBM continues to push the LAN Manager and LAN Server OS/2-based combination, it has tacitly agreed that Novell's solution is more appropriate for some customers. By selling NetWare, IBM indicates it is willing to respond to the needs of its largest customers, many of which have significant installed bases of NetWare.

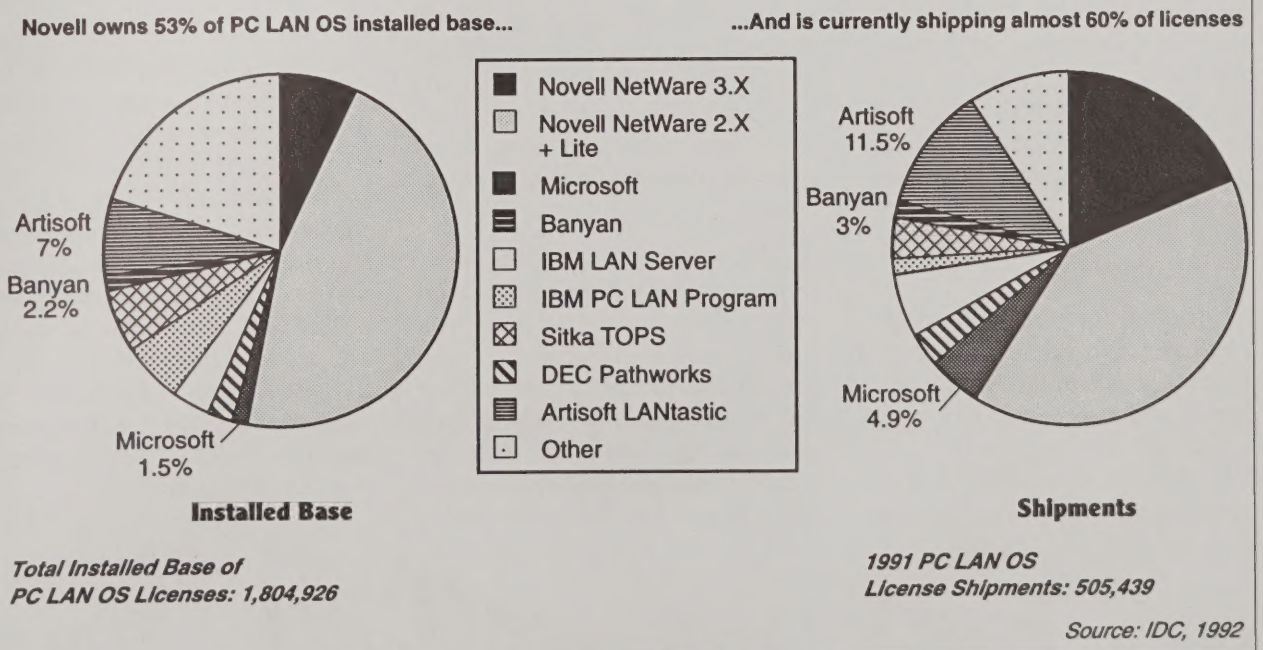
IBM will continue to sell OS/2 2.0 and OS/2 LAN Server to its large accounts for distributed computing, client/server and SAA compatibility. NetWare will remain IBM's response for customers that already have NetWare, need specific NetWare applications, or have small network sites.

Digital Equipment

In the past two years, Digital has launched an aggressive assault on the PC LAN market. It has introduced a wide range of new products, including Pathworks software, which supports DOS, OS/2, Macintosh and Unix clients and a range of servers (PC and VAX). Digital has also unveiled a LAN service and support program for NetWare and LAN Manager users.

Digital's sales of PC LAN products have grown slowly. Digital's primary channel has been its direct sales force; most customers have large VAX installations. In order to expand beyond its current 3% market share, Digital needs increased penetration of traditional LAN distribution channels (VARs), as well as a stronger marketing effort.

Worldwide 1991 PC LAN OS License Shipments and Installed Base



Source: IDC, 1992

Some Market Leaders Are Milking the Cash Cow — But Is That So Wrong?

Intel, Microsoft, Novell — three very successful companies. By wits or by luck, all three grew to dominate their respective market segments during the period from 1985 to 1990, when the personal computer industry autopiloted to double-digit growth rates.

How'd they get there? The success of all three companies was the result of talented people working hard. Motorola was thought to have a better microprocessor design. DRI had a better desktop OS. But IBM came along and handed Intel and Microsoft a golden opportunity that, to their credit, they exploited fully. Each company was in the right place at the right time with the right marketing message and story.

Now, however, each of the three companies is feeling real competition. For the first time, each company is on the receiving end of jabs aimed directly and specifically at them. The Intel X86 is a target for a host of newcomers: AMD, Cyrix, Sparc, Hobbit. Apple's Pink, IBM's OS/2, and Sun's Solaris are aimed squarely at DOS and Windows. Windows for Workgroups and Artisoft's LANtastic are aimed at the low end of Novell's product line.

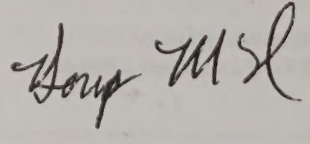
The new competition brings into question the degree to which the prosperity of the three companies with monopoly-like market shares are intertwined. To date, their products have barely overlapped. With Workgroups for Windows and DR-DOS, Microsoft and Novell now compete head to head. For the first time, the individual successes of the three are not mutually beneficial. In fact, Microsoft's future success will come at Novell's direct expense, and vice versa...the first time any of the three have been in completely adversarial relationships with each other.

Since 1990, the three companies have employed similar strategies to maintain preeminence. They have extended the useful lives of their core products the same way a manufacturing company keeps old machinery working: with baling twine and chewing gum.

Take Intel or Microsoft. Many will argue the industry's most successful, most profitable, most useful and most powerful microprocessor is architecturally oblique. Retrofitting it while maintaining backward compatibility results in a product that's not pretty, but it works. By selectively adding functions (primarily through Windows) Microsoft has extended DOS's lifetime without the pain or upheaval of a massive and wholesale replacement.

Upgrading NOS software is more complex than building faster microprocessors or adding new functions to a desktop operating system. Particularly in the midst of the tectonic shift to LAN-centric networking. NetWare was designed to share resources between office PCs. Now it's being asked to support enterprisewide applications. NLMs may not be enough. A company more prone to risk-taking might bet the business on a whole new NetWare. Novell probably won't.

However, that may not be so bad. Companies enjoying 60% market share usually have only one direction to go — down. But as IBM has learned, milking a cash cow can be a very profitable business strategy. Few will argue that IBM has not profited handsomely during the decline of its overall market share.

Absent a radical new strategy, one of Novell's chief concerns is managing the slow decline in its market share. It will focus more and more of its efforts on new ancillary products and services and will continue to sell the safety of anything-anything connectivity against the FUD of buying from smaller NOS suppliers.

Customers won't likely see any earth-shattering new technology from Novell. Competitors like Artisoft and Banyan will slowly increase their market share. At some point, Novell *may* feel the need to alter its fundamental outlook and business model. But for now, slowly evolving an enterprisewide perspective will allow Novell to continue to emphasize near-universal connectivity, its singularly most important attribute.